APPENDIX A11

TRIMATIX LABORATORIES, INC.

Quality Assurance Manual

Analytical Services

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1.0 TITLE PAGE

QUALITY ASSURANCE MANUAL

Policies and Procedures Required of the Personnel Employed by TriMatrix Laboratories, Inc., Including the Organic, Inorganic, and Metals Laboratory Areas

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Quality Assurance Manager: _____ Date: 3/16/07

Technical Director: _____ Date: 3/16/07

Laboratory President: _____ Date: 3/16/07

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3.0 QUALITY SYSTEM

3.1 INTRODUCTION: THE TriMatrix QUALITY SYSTEM

3.1.1 Manual Purpose

The purpose of this manual is to outline the organization, specify the procedures, and define the technical requirements utilized by TriMatrix Laboratories, Inc. The goal is to ensure that all data generated is of the required quality, is reproducible, and is generated in a timely manner. This manual details a Quality Assurance/Quality Control (QA/QC) program encompassing the entire analytical efforts at TriMatrix, from project initiation to report generation. Some areas are covered with only a cursory discussion, while others are covered in detail, or are included in more than one section, depending on their importance. This manual describes the realistic functions of the quality programs in place, with an understanding that not every situation is covered nor every contingency explored.

3.1.2 The Need for Analytical Quality Assurance/Quality Control

In the increasingly competitive business of environmental laboratory services, the primary tenet of continued success is to efficiently provide results of the necessary quality. TriMatrix agrees with this tenet, considers analytical quality assurance and quality control to be of prime importance, and has incorporated it as the central pillar of our efforts to remain on the leading edge of the environmental laboratory field. The requirements we place on ourselves are in concert with the needs and agendas of other organizations, such as the Environmental Protection Agency (EPA), governmental and industrial clients, and various state and local regulatory agencies.

Quality assurance and quality control (QA/QC) functions absorb nearly fifty percent of the available effort involved in routine analysis, and continues to evolve and grow in importance. This level of quality is absolutely essential for two reasons: 1) accurate analytical data is obtained only with the concurrent

use of extensive QA/QC to regulate and monitor the many process variables that can potentially introduce errors into chemical analyses, and 2) clients make crucial business decisions based on the data supplied by the laboratory. Lab data not properly supported by adequate quality assurance/quality control practices and procedures can be questionable at best, and can lead to faulty or erroneous decisions in the field. In the overall analytical effort the additional time spent for QA/QC is time necessarily spent.

3.1.3 Definition of Terms

3.1.3.1 Quality Assurance

Quality Assurance (QA) is defined as those operations and procedures undertaken to provide measurement data of documentable quality that have a stated probability of being accurate. The measurement system part of the quality assurance program must be in statistical control to justify this probability statement.

The operations and procedures established as part of the overall quality assurance program encompass all aspects of the laboratory operations, including but not limited to: organizational structure, human resources, physical resources, methodology, analyst training and certification, data reduction, data validation, and instrument maintenance and troubleshooting. All aspects of QA are organized, implemented, and monitored through written standard operating procedures.

3.1.3.2 Quality Control

Quality control is defined as the basic checks necessary to produce a good measurement program. These checks include but are not limited to: proper calibration and calibration verification, statistical monitoring of accuracy and precision, of quality control samples

(e.g. laboratory control samples, blanks, duplicates, spikes, etc.), interference monitoring, and reagent control.

Adequate records are maintained to support data quality, to locate assignable causes in measurement problems, to improve the accuracy and precision of the measurement system, and to provide a historical record of traceability.

3.1.3.3 Quality Assessment

Quality assessment is defined as those specific steps utilized to evaluate the quality of the measurement process. These steps include use of control charts to plot multiple data points over time, monitoring parameters by statistical control, internal performance audits, external performance audits, certification programs conducted by individual states, and performance evaluation sample programs.

3.2 QUALITY POLICY STATEMENTS FROM MANAGEMENT

As communicated from top management through the entire organization, TriMatrix Laboratories, Inc. is driven by the following quality objectives and commitments.

3.2.1 Corporate Quality Objectives

- To create and maintain a uniform and controlled pattern for performing routine tasks within the organization, based on standard operating procedures.

- To generate legally defensible, scientifically sound laboratory data of documented quality.

- To build quality into the workplace ensuring services contributing to successful relationships with our customers, employees, and vendors.

- To develop, deliver, and maintain, excellence in all operational areas.

- To provide a service that consistently meets or exceeds client expectations.

3.2.2 Corporate Quality Commitments

- To support quality by underwriting the substantial cost of the quality commitment even though such expenses do not result in increased productivity or a tangible product.

- To maintain a work environment in which all employees are free from commercial pressures in the performance of their duties.

- To maintain a work environment in which all employees are free from internal organization or external client related pressures that may influence the quality of their work.

- To educate all employees in fraud prevention and their ethical responsibilities associated with analytical and data reporting activities.

- To ensure that client confidentiality and information are strictly protected.

- To implement on-going improvement in every area of laboratory activity.

- To create and maintain a Quality Environment with an all-encompassing determination to meet the needs and quality objectives of our clients.

- To commit and adhere to the requirements specified in ISO/IEC 17025.

- To commit and adhere to the requirements specified by the NELAC Standards.

Included with these improvements and commitments is an annual review process where the management of TriMatrix Laboratories performs a comprehensive review of the quality system. This review monitors the effectiveness of the quality system and provides feedback for on-going improvement. Policy changes made as a result of the annual review will be reflected in the QA Manual.

3.3 ORGANIZATION AND RESPONSIBILITIES

An efficient organizational operation requires a quality control program facilitating a high level of multi-directional communication and information flow. Each person in the TriMatrix organization inputs and receives information from the quality system. This information flow optimizes management directives with minimum disruption, and provides the means for creating improvements.

3.3.1 Corporate Structure

Flow of both administrative and quality control information is presented in Figure 3-1. This diagram graphically displays the corporate philosophy concerning the interaction of QA/QC and the generation of analytical data. The general flow of data in this format gives QA/QC independence in fulfilling its function while still acting as a liaison with the administrative staff. To further explain this interaction, a detailed description of roles and responsibilities is presented for each key laboratory position.

3.3.2 Laboratory President

Responsibilities of the Laboratory President are directed at the overall operation and management of the laboratory. Primary responsibilities include, but are not limited to: 1) develop and meet budgets established for the laboratory, 2) manage analytical services productivity and quality, 3) oversee and develop new business activities including client relations development, 4) plan analytical services organization, leadership and management programs, 5)

develop and manage human resources including career path planning, and 6) performing duties as Deputy Technical Director when necessary.

3.3.3 Quality Assurance Manager

The Quality Assurance Manager is primarily responsible for the implementation, maintenance, reporting, and development of all QA/QC activities performed within the laboratory. Duties include, but are not limited to: 1) QA/QC systems development and monitoring, 2) coordination of all documentation procedures including the development and control of standard operation procedures, 3) monitoring method and quality control requirements as published by regulatory agencies ISO/IEC 17025, and the NELAC Standards, 4) performing internal lab audits, 5) maintaining in-house QA/QC monitoring procedures and policies, and 6) providing quality assurance guidance and training to all staff members. The Quality Assurance Manager has the authority to stop work as a result of poor data quality.

3.3.4 Technical Director

The Technical Director is responsible for the overall technical capabilities and direction of the laboratory. Specific responsibilities include: 1) organization and management of new analytical technologies developed by the laboratory, 2) adherence to ISO/IEC 17025 requirements and NELAC Standards, 3) equipment procurement management.

3.3.5 Health and Safety Officer

The Health and Safety Officer is responsible for implementation, monitoring, and maintenance of all laboratory safety and chemical hygiene programs. Specific responsibilities include the development and maintenance of health and safety programs and manuals.

3.3.6 Vice President of Laboratory Operations

The Vice President of Laboratory Operations is responsible for the overall supervision of the individual laboratory areas. General responsibilities include management of staff activities such as scheduling, budgeting, training, and general supervision. The Vice President of Laboratory Operations also is responsible for 1) the development and management of all chemists, analysts, technicians, 2) implementation of quality systems and controls within the laboratory, 3) scheduling analysis activities, 4) meeting productivity goals and project deadlines, 5) technical development of the laboratory staff, 6) approval of laboratory's SOPs, 7) coordination of methods development with the staff and Technical Director, 8) approval of laboratory data, or the delegation thereof, 9) Approval of procurement activities, 10) Overall laboratory performance, and 11) adherence to ISO/IEC 17025 requirements.

3.3.7 Client Services Manager

The laboratory Client Services Manager supervises both the Client Services and the Data Management Group. Responsibilities of the Client Services Manager include management of scheduling and method development needs, budgeting, training, and general supervision, with specific emphasis on the following activities: 1) development and management of all project chemists, project chemist technicians, log-in staff, bottle preparation staff, laboratory couriers, the Field Services Group, and Data Management Group, 2) project management, 3) coordination of proposal preparation and marketing activities for existing and new clients, 4) monitoring of final report turnaround times and, 5) monitoring client satisfaction with laboratory services.

3.3.8 Deputy Quality Assurance Manager/Deputy Technical Director

The Deputy Quality Assurance Manager/Technical Director has the responsibility of fulfilling an interim role as outlined in sections 3.3.3, 3.3.4, 3.5.1.2, and 3.5.1.3.

3.3.9 Sales and Marketing Staff

The Sales and Marketing Staff are responsible for all marketing, business development, and client maintenance activities. These activities include but are not necessarily limited to: 1) market research/gathering market intelligence, 2) consulting with company management to develop a corporate business strategy and plan, 3) development and implementation of a corporate image campaign, 4) development and distribution of marketing materials (corporate literature, etc.), 5) client prospecting, 6) presenting/introducing company services to prospective clients, 7) account development, management and maintenance (in conjunction with Project Chemists), 8) development of corporate pricing guidelines, 9) development of proposals, quotations, bids and qualifications summaries, and 10) contract review, negotiation and execution.

3.3.10 Organizational Chart

Presented in Figure 3-2 is an organizational chart illustrating the personnel structure within the laboratory.

3.4 RELATIONSHIPS

Relationships within the analytical laboratory are organized through management into three main categories: Technical Operations, Support Services, and the Laboratory Quality System. The relationships between management and these operations define and maintain the delicate balance in a cost-effective, highly-technical, quality laboratory operation. An overview of each relation is presented below:

3.4.1 Management-Technical Operations

The relationship between management and technical operations is illustrated in Figure 3-3. In this relationship, the main role of management is to provide guidance and financial support to the programs and directives of the Technical Director. Through this structure, technical operational enhancements and developments occur and are applied through the laboratory staff.

3.4.2 Management-Support Services

The relationship between management and support services is illustrated in Figure 3-4. In this relationship, management's role is substantial in the day-to-day operation of each service.

The primary laboratory support groups are Client Services, Sales and Marketing, and LIMS system support. These groups report directly to the Laboratory President for all aspects of their daily activities.

Secondary relationships are maintained with the Laboratory Administrative Assistant, Laboratory Receptionist, Accounting, and the Human Resources Department. Some groups within this secondary category maintain relationships not only with the Laboratory President, but also with other management groups within the TriMatrix organization.

A tertiary relationship has been developed between the Laboratory President and Vice President of Laboratory Operations. This relationship supports productivity monitoring, cost containment, equipment procurement, operations management, personnel/human resources activities, technical support, data validation, and method development.

3.4.3 Management-Quality System

The relationship between management and the laboratory quality system is illustrated in Figure 3-5. In this relationship, management plays a secondary role in the overall scheme. This secondary role provides the quality assurance manager with guidance, company perspective, and structured support in the development, implementation, and maintenance of quality system programs and activities.

This relationship is vital to the success of TriMatrix Laboratories. Without a cost-effective quality system, the overall caliber of laboratory data and the success of all laboratory operations would be jeopardized.

A relationship also exists between management, the quality system, the laboratory support, and the HR staff. This relationship includes but is not limited to: laboratory management directives, and human resources/personnel activities. These activities are implemented and maintained without disruption to the quality system, and are depicted via the dashed lines on Figure 3-5.

3.5 JOB DESCRIPTIONS

The strength of a laboratory lies in the experience and dedication of its employees. TriMatrix hires quality personnel based both on work attitude and past job experience. Job descriptions have been written to define the employee qualifications required for each position.

3.5.1 Management Staff Members

Managerial positions are responsible for the development of their respective employees. These positions have specific minimum requirements for years of experience.

3.5.1.1 Laboratory President

Job Description

The Laboratory President (LP) directs the laboratory. The LP works through the Vice President of Laboratory Operations to improve data quality, overall productivity, staff development, safety/training programs, and overall profitability. This position has profit/loss accountability. Budgets are developed annually with senior management. The LP is also directly involved in business development/sales activities, and the sales staff reports directly to him.

Background/Educational Requirements

The LP possesses minimally a bachelor's degree in science, preferably chemistry. The LP has a minimum of 10 years direct

work experience in the environmental testing industry. This work experience includes having conducted environmental analyses and several years of demonstrated supervisory experience.

Duties and Responsibilities

1. Development and fulfillment of budgets.
2. Management of total laboratory productivity and quality.
3. Management of proposal preparation.
4. Development of new business and maintenance of client relationships.
5. Development of laboratory organization, leadership, and management planning.
6. Working with the Human Resources department to develop staff members and their career paths.

3.5.1.2 Quality Assurance Manager

Job Description

The Quality Assurance (QA) Manager is responsible for the development, implementation, improvement, and maintenance of all quality systems at TriMatrix. The QA Manager monitors all the analytical methods and procedures performed by the laboratory, and assures compliance with regulatory agency requirements.

Background/Educational Requirements

The QA Manager possesses a B.S. in science, preferably chemistry, and suitable work experience. Work experience must include several years of analytical work and a demonstrated ability to work with and train staff members. A strong working knowledge of quality assurance and statistical quality control procedures, specifically as they apply to analytical protocols, is required.

Duties and Responsibilities

1. Development and implementation of systems to measure and monitor laboratory data quality.
2. Maintenance of the documentation system for generation, control, and archiving laboratory forms, SOPs, and protocols.
3. Approving SOPs and monitoring their compliance with regulatory agency requirements.
4. Maintaining and updating the laboratory Quality Assurance Manual.
5. On-going investigation for optimizing procedures to minimize out-of-control data.
6. Maintenance of federal, state, and industrial certifications and accreditations as required.
7. Monitoring internal quality programs within the laboratory and reporting their status to management.
8. Training and training documentation of all staff members in all aspects of the laboratory quality system.
9. Perform other duties as deemed necessary by management.

3.5.1.3 Technical Director

Job Description

The Technical Director (TD) is responsible for the development and improvement of technical operations within the laboratory division. The TD oversees the investigation of all new instruments and equipment, method development, and general technical advancement of the laboratory. The TD is also responsible for informing the Deputy TD of current and pending projects and activities.

Background/Educational Requirements

The TD possesses a B.S. in science, preferably chemistry, and suitable work experience. Such work experience includes several years of analytical work and a demonstrated ability to work with and train staff members. A strong working knowledge of

instruments and methodologies, specifically as they apply to analytical protocols, is required.

Duties and Responsibilities

1. On-going technical development of the TriMatrix Laboratory pertaining to current and future analytical practices.
2. Overseeing the technical development of TriMatrix staff in the areas of method comprehension and implementation.
3. Development of new analytical procedures within the laboratory.
4. Providing technical advice regarding all equipment and apparatus procurement, and acquisitions.
5. Performing technical review of all Quality Assurance Project Plans (QAPPs).
6. Perform other duties as deemed necessary by management.

3.5.1.4 Client Services Manager

Job Description

The Client Services (CS) Manager is responsible for the supervision of the project chemists, project chemist technicians, sample log-in staff, bottle preparation staff, laboratory couriers, field services group, and laboratory administrative staff. These responsibilities include meeting project due dates, preparing and reviewing quotations, project initiation and management, client satisfaction management, and supervision and training of staff. The CS Manager strives for improvement in the on-time delivery of laboratory projects.

Background/Educational Requirements

The CS Manager possesses a B.S. in science, preferably chemistry, and has 5-10 years of work experience. The work experience includes 3-5 years of laboratory experience, involvement in client

management activities, and a demonstrated ability to supervise and train laboratory staff.

Duties and Responsibilities

1. Responsible for the productivity and quality of the client services group.
2. Management of large Level 3 or higher projects.
3. Quality control program implementation and maintenance.
4. Supervision and technical development of employees.
5. Development and maintenance of standard operating procedures.
6. Assisting and coordinating marketing activities through proposal preparation and client visitation.
7. Perform other duties as deemed necessary by management.

3.5.1.5 Vice President of Laboratory Operations

Job Description

The Vice President of Laboratory Operations (VPLO) is responsible for the individual laboratory areas and the supervision of laboratory staff. These responsibilities include meeting project schedules, and the supervision and training of staff members. The VPLO continually works to improve the quality of data generated.

Background/Educational Requirements

The VPLO possesses a B.S. degree in science, preferably chemistry, and 5-10 years work experience. The work experience includes a minimum of 5 years in the laboratory utilizing a variety of techniques. The VPLO must also demonstrate an ability to supervise and train staff members.

Duties and Responsibilities

1. Responsible for the productivity and quality of the laboratory areas.

2. Operation and maintenance of instrumentation and apparatus.
3. Quality control program implementation and maintenance.
4. Reviewing and final approval of all organic data.
5. Scheduling in-house to allow on-time report generation.
6. Supervision of supply acquisition activities.
7. Supervision and technical development of employees.
8. Approval of standard operating procedures.
9. Methods development.
10. Perform other duties as deemed necessary by management.

3.5.1.6 Laboratory Computer Systems Administrator

Job Description

Provide technical review, guidance, and training in current and future laboratory computer applications.

Background/Educational Requirements

Requires a degree in computer sciences with an emphasis in a chemistry or general science curriculum.

Duties and Responsibilities

1. Developing a complete understanding of the Laboratory Information Management System (LIMS).
2. Reviewing laboratory computer applications and processes, including instrument computer interfaces, data transmission/archiving processes and document control.
3. Providing database maintenance support activities for the LIMS system.
4. Providing technical direction and orchestrating implementation of electronic storage systems for the laboratory.
5. Providing technical training of the laboratory staff in software applications and basic computer operational activities.
6. Perform other duties as deemed necessary by management.

3.5.2 Technical Staff Members

Technical staff members are classified into chemist or technician levels dependant on job type, education, and years of experience. Level Classifications are Chemist I-V and Senior Chemist, Project Chemist I-V and Senior Project Chemist, Technician I-V and Senior Technician. In addition, qualified candidates are also eligible for group leader status. Classification descriptions are provided in Appendix A. To aid the employee in identifying the different classification requirements, the differences are printed in bold italicized text. The various classifications are also used by the employee and by management for career path development at TriMatrix.

3.6 MANAGEMENT RESUMES

Laboratory President
Quality Assurance Manager
Vice President of Laboratory Operations
Human Resources Manager

DOUGLAS E. KRISCUNAS — Laboratory President

EDUCATION

B.S., Environmental Sciences, Grand Valley State University, 1976

PROFESSIONAL SUMMARY

Mr. Kriscunas is responsible for the accuracy and integrity of all analytical data finalized at this location. He is continuously available for client support to resolve analytical issues as they pertain to environmental problems.

PROFESSIONAL EXPERIENCE

- **Detroit, Michigan**. Laboratory Supervisor for a field laboratory established at the Detroit Wastewater Treatment Plant. The project involved a one-year pilot study of the overall operation and plant performance to upgrade and modify existing treatment processes to meet current and future discharge limits. Approximately 20,000 samples were analyzed by seven full-time analysts.

- **Edmore, Michigan. Hitachi Magnetics Corporation.** Participated in the development and implementation of an on-site, flow-through bioassay of the plant discharge. The study was performed in conjunction with the Michigan Department of Natural Resources, Water Quality Division.

- **Grand Rapids, Michigan. EDI Laboratory Certification.** Direct responsibility for the inorganic parameters analysis and quality control measures necessary for laboratory certification under the Safe Drinking Water Act (SDWA) of 1974. Certification involved both analysis of unknown control samples and corresponding on-site evaluation by the U.S. EPA Region V laboratory certification team.

- **Muskegon, Michigan. Uniroyal Chemical Company.** Participated in the soil survey and on-site evaluation of potential soil contamination from deposited chemical waste materials produced by a major chemical company. On-site sample analyses for select parameters were made to locate and detail the extent of contamination.

- **Edmore, Michigan. Hitachi Magnetics Corporation.** Participated in the implementation of a treatability study to effectively remove cobalt and samarium from industrial waste. The study results led to the design and installation of treatment facilities.

- **Columbia, Missouri. A.B. Chance Corporation**. Responsible for implementing a treatment study for effective removal of heavy metals from process wastewater in order to achieve acceptable discharge limits.

- **Kent County, Michigan. Mill Creek Watershed Management Project**. Participated in the collection, mapping, and interpretation of environmental characteristics to be used as prototype guidelines for the management of area wide streams in the Great Lakes Basin. The project was funded by the Environmental Protection Agency.

- **Three Rivers, Michigan. Hydramatic Division, General Motors Corporation.** Responsible for the analytical services conducted on a survey of process wastewater for an automotive transmission manufacturer. The project involved data collection and analytical services including grab samples, setting automatic samplers on an hourly basis for a seven-day period, and installing recording meters for continuous pH monitoring.

- **Grand Rapids, Michigan. Michigan Department of Public Health Laboratory Certification.** Supervised analytical, bacteriological, and quality control activities involved in achieving certification status for the analysis of potable water supplies in Michigan.

- **Higgins Lake, Michigan. Ralph MacMullan Conference Center**. Served on a three-member panel before a meeting of the Northern Michigan Environmental Health Association. The topic of discussion was an overview of organic chemicals now found in much of Michigan's ground waters. A representative from industry and the MDPH laboratory completed the panel.

- **Grand Rapids, Michigan. Haviland Chemical Company.** Coordinated a static bioassay performed on a water-based detergent utilizing fathead minnows in the 96-hour static test.

- **Sparta, Michigan**. Conducted a dendrological survey of a proposed oil drilling site. The survey was incorporated in an overall environmental assessment of the proposed drilling site.

- **Caledonia, Michigan**. Conducted a dendrological survey of riparian vegetation types located along the banks of the Thornapple River in the area of the Labarge Dam.

- **Grand Haven, Michigan**. Conducted a limnological investigation of the estuary waters of the Grand River watershed near Grand Haven. The collected limnological data were evaluated for potential eutrophication problems resulting from nutrient discharges upstream.

- **Kalamazoo, Michigan. American Cyanamid Company**. Supervised laboratory work required in assisting a major chemical manufacturer with a permit application for existing facility hazardous waste management operation to administratively complete four supplemental technical attachments, multidisciplinary services were required in the areas of hydrogeologic investigation, environmental assessment, failure mode assessment, and engineering review. Field work was completed in 19 days with a report to the client in 25 days to meet scheduled deadlines.

- **Kent County, Michigan**. Coordination of field and laboratory services in conjunction with Act 641 monitoring requirements at two county-owned and operated refuse sites.

Specialized studies were also conducted to identify possible use of landfill gases for electric power generation and the source identification of volatile organic contaminants typical of most municipal landfills.

- **Cascade Township, Michigan. Cascade Resource Recovery/Waste Management, Inc.** Implementation of two separate tracer studies aimed at pinpointing possible cracks or defects in the clay liners of four hazardous waste disposal trenches. The study utilized a low absorptivity fluoroscene water soluble dye introduced to each trench. Samples collected from each liner failure detection system were then analyzed for the fluorescent characteristics of the dye.

- **Cascade Township, Michigan. Cascade Resource Recovery/Waste Management, Inc.** Coordination of field and laboratory services in connection with Michigan Department of Natural Resources Act 64 and U.S. EPA RCRA monitoring requirements. Each sampling event involves collection of ground waters, surface waters, and leak detection monitoring sites.

- **Cascade Township, Michigan. Cascade Resource Recovery/Chemical Waste Management, Inc.** Acted as project chemist and field services coordinator for activities involved in the excavation and site decontamination of an Act 64/RCRA hazardous waste disposal facility. The decontamination program involved the analysis of soils collected in and around each disposal trench after the removal of approximately 20,000 cubic yards of waste materials.

- **Cincinnati, Ohio. Rumpke Waste Systems, Inc.** Acting project manager for a large waste disposal firm headquartered in Ohio, with 20+ landfills located in a 5 state geographical area. Mr. Kriscunas is responsible for coordination of laboratory activities in conjunction with all ground water, surface water, and NPDES monitoring requirements.

RICK D. WILBURN — Quality Assurance Manager

EDUCATION

B.S., Environmental Studies, Earlham College, 1985

PROFESSIONAL SUMMARY

Mr. Wilburn is responsible for all aspects of the laboratory Quality Control/Quality Assurance Program. Primary responsibilities include conducting internal and external auditing of the laboratory, procurement and maintenance of state and federal certifications, and ensuring that all facets of the quality control program remain at the highest level possible. Mr. Wilburn also manages the external and internal Quality Control check sample programs.

PROFESSIONAL EXPERIENCE

- **TRACE Analytical Laboratories, Inc. – Quality Assurance Manager, 12/95 – 10/96.** Responsible for designing, implementing, and monitoring a formal quality control program. The program included: conducting internal and hosting external audits, implementing corrective actions resulting from any deficiencies, scheduling and reporting performance evaluation sample results, and the review of all Level 5 data packages.

- **EARTH TECH – Organic Laboratory Manager, 10/95 – 12/95.** As Organic Laboratory Manager, Mr. Wilburn was responsible for the day-to-day operations of the organic laboratory, including volatile and semi-volatile analyses by gas chromatography and gas chromatography/mass spectrometry. His responsibilities included scheduling, instrument maintenance, the writing and implementation of standard operating procedures, quality assurance, analytical data review, the technical development of all the organic laboratory personnel, and project management. Mr. Wilburn was also responsible for research and development in the organic laboratory, focusing on ways to automate and improve sample analysis, data quality, and turnaround time.

- **EARTH TECH (Formerly WW Engineering & Science) – Semi-Volatile Laboratory Supervisor, 1/94 – 10/95.** Responsible for the daily operation of the semi-volatile laboratory. The semi-volatile laboratory utilizes gas chromatography, gas chromatography/mass spectrometry, and high performance liquid chromatography in the analysis of semi-volatile organic compounds.

- **WW Engineering & Science – Supervisor, Organic Extraction Laboratory, 4/93 – 1/94.** Supervisor of the staff of chemists responsible for all organic extractions. Accountable for the processing, quality, and turn around of a wide variety of samples involving many extraction techniques and methodologies. Continually experimenting with automation and new technologies to improve extraction quality and turn around time, including solid phase and supercritical fluid extractions.

- **WW Engineering & Science – Supervisor, Mass Spectrometry Laboratory, 9/89 – 1/94.** Supervisor of the staff of chemists analyzing samples for semi-volatile organics in the mass spectrometry laboratory. Oversee all analysis and daily activities involved with the mass spectrometry laboratory. Evaluate, recommend, and implement new technologies. Implementations of these include sub-ambient injections using a Varian SPI injector, sub-ambient temperature programs for optimized chromatography, and the use of ion trap mass spectrometers for lower operating detection limits

- **IT Corporation, (formerly PEI Associates, Inc.) – Chemist, Level 3, GC/MS Semi-Volatile Team Leader, 7/88 – 9/89.** Along with daily analysis of samples, responsible for coordinating the efforts of the three analysts and three instruments used for semi-volatile analysis. This included scheduling each instrument/analyst to make sure analyses were completed correctly and on time, training new personnel, instrument maintenance, data checking, and reporting project results to management for client distribution. Leader of GC/MS Quality Circle group.

- **PEI Associates, Inc. – Chemist, Level 2, GC/MS Analyst, 12/86 – 7/88.** Primary responsibilities included analyzing soil, water, and other media with an Extrel ELQ-400 mass spectrometer system. Analyses performed included semi-volatile and volatile organics listed on the EPA's Toxic Compounds List according to the Contract Laboratory Program protocol. Also analyzed various other non - Toxic Compounds List compounds using appropriate methods.

- **PEI Associates, Inc. – Chemist, Level 1, GC Analyst, 7/85 – 12/86.** Carried out a variety of organic analyses in a wide range of matrixes. Was a primary analyst conducting CLP testing for pesticides and PCBs, and was the primary analyst for routine and non-routine testing for herbicides, and volatile organics.

JEFFREY P. GLASER — Vice President of Laboratory Operations

EDUCATION

B.S., Biochemistry, Michigan State University, 1987

PROFESSIONAL SUMMARY

Mr. Glaser is responsible for the operation and management of the laboratory areas. Main functions include supervision and training of personnel, formulation of standard operating procedures, final approval of laboratory data, and laboratory purchase approval.

PROFESSIONAL EXPERIENCE

- **TriMatrix Laboratories, Inc., Muskegon – Laboratory Manager, 1994 – 1996.** Responsible for all aspects of laboratory performance. He was responsible for all aspects of laboratory performance including, analytical testing and reporting; business development; customer service; capital expenditures, quality control; quality assurance; laboratory safety; and laboratory profitability. He was responsible for the hiring, training, guidance, and evaluation of all laboratory personnel, and for direction of overall laboratory policies and practices.

- **Great Lakes Environmental Laboratories – Senior Chemist, 1992 – 1994.** Mr. Glaser's responsibilities included supervision and training of other laboratory personnel, coordination of sample workloads, data review and evaluation, and quality control. He was also responsible for analysis of pesticides, PCBs, and herbicides using an HP 5890 GC w/ECD detectors.

- **Anatech Analytical Laboratories – GC/MS Operator, 1990 – 1992.** Mr. Glaser was responsible for the mass spectrometry analysis of environmental samples in a variety of matrixes for both volatile and semi-volatile organics. For volatiles, Mr. Glaser operated and maintained a Finnigan Ion Trap GC/MS system consisting of a Varian GC and a Tekmar purge and trap autosampler. Primary methodology used was 624/8240. For semi-volatiles, he operated and maintained a Hewlett Packard GC/MSD UNIX-based Chem Station. Primary methodology used was 625/8270. He was also responsible for method development. He served as the Organic Supervisor for the first quarter of 1991.

- **Anatech Analytical Laboratories – Volatile Organic Chemist, 1989 – 1990.** Mr. Glaser was responsible for operation and maintenance of two volatile GC systems utilizing ELCD, FID, and PID detectors, and Tekmar and O.I. Analytical purge and trap autosamplers. Primary analyses were 601 and 602.

STACY K. VANDEN AKKER — Human Resources/Business Manager

EDUCATION

B.S. Business Management, Davenport Business College, 1996.

PROFESSIONAL SUMMARY

As Business Manager, Ms. Vanden Akker is responsible for the record keeping and review of all financial data for the company. She manages accounts payable, accounts receivable, cash flow, and the generation of financial statements and other management reports. She maintains accurate records for potential audit or other review.

Ms. Vanden Akker also manages all Human Resource functions for TriMatrix Laboratories. She processes payroll on a biweekly basis, coordinates employee benefits, handles internal employee questions and concerns, assures compliance with all federal, state, and local employment laws and regulations, and maintains complete and accurate personnel data files.

PROFESSIONAL EXPERIENCE

- **EARTH TECH – Environmental Laboratory Business Office, Administrative Assistant, 9/95 – 1/97.** Responsible for assisting the Business Office Manager with accounts receivable, accounts payable, and the daily input of purchases and invoices.

- **EARTH TECH – Lowell Wastewater Treatment Plant Operator/Laboratory Technician, 8/93 – Present.** Responsible for sample collection, equipment maintenance, and the daily laboratory analysis of suspended solids, CBOD, ammonia, zinc, fecal coliform, pH, residual chlorine, and phosphates. She is also responsible for the correct input of all results into the reports required by the State of Michigan Department of Environmental Quality.

- **EARTH TECH – Lowell Wastewater Treatment Plant Assistant Laboratory Technician, 8/90 – 8/93.** Assisted the Laboratory Technician in the laboratory analysis of suspended solids, CBOD, ammonia, zinc, fecal coliform, pH, residual chlorine, and phosphates.

3.7 APPROVED SIGNATORIES

Designated laboratory staff members have the responsibility of validating laboratory documents on behalf of the laboratory organization. General categories and documents requiring a valid signature are presented below.

3.7.1 Client/Invoice Reports

All laboratory reports compiled and mailed contain at least one representative signature validating the contents of the laboratory report. By default, a report is signed by the appropriate project chemist. Alternate and/or additional signatures include the Laboratory President, Client Services Manager, Technical Director, Quality Assurance Manager, and Vice President of Laboratory Operations. No other individuals are approved to perform signatory approval of client/invoice reports.

3.7.2 Proposals, Price Quotations, and Laboratory Contracts

Proposals or price quotations for laboratory services contain at least one representative signature, validating the pricing, terms, and conditions of the quotation. At least one representative signature is required. Approved signatures for proposals and price quotations include the Laboratory President, Client Services Manager, project chemists, and a sales or marketing representative.

Required signatures for laboratory contracts are the Laboratory President and a Sales or Marketing representative.

3.7.3 Quality Assurance Project Plans (QAPP)

Quality Assurance Project Plans contain representative signatures of several responsible parties outside the laboratory. The only laboratory signature generally found on a QAPP is that of the QA Manager. The QA Manager has designated QA/QC responsibilities that are fully documented in QAPP

documents. All QAPPs are signed prior to submission to a governing body or client.

Signatures on the QAPP ensure all procedures, materials, quality control practices and project reports meet the predefined goals of the plan.

3.7.4 Purchase Orders and Agreements

Because the laboratory spends a significant portion of its annual budget on supplies and equipment, guidelines have been established to document and control purchasing.

Purchasing of general supplies is handled through a contracted vendor within the budgetary guidelines established for each laboratory area.

For major purchases such as equipment, service assessments, or building renovations in excess of $500.00, purchase orders or agreements must be approved by the Laboratory President or CEO.

3.7.5 Binding Statements - Laboratory Certification Documents or Accreditation

Many certification or accreditation programs require the laboratory to provide items and statements regarding details on the laboratory's operations and staff. In some cases these statements must be presented to the certifying body accompanied by a binding signature of the laboratory president or CEO.

3.8 CAPABILITIES, CERTIFICATIONS, ACCREDITATIONS, AND PROFICIENCY TESTING PROGRAMS

3.8.1 Capabilities

TriMatrix conducts analytical laboratory services in support of all major environmental regulations, including CERCLA, RCRA, CWA, CAA, and TSCA.

The laboratory is capable of routinely analyzing a variety of sample matrices, including drinking water, surface water, wastewater, soil, groundwater, solid waste(s), and sludge(s). In addition, analyses have been performed on fish tissue, biota, and air samples by project request.

TriMatrix routinely performs a wide array of environmental and non-environmental, chemical and physical analyses. A list of methods currently utilized by TriMatrix is provided in Appendix B. To maintain a quality system of analytical protocols, TriMatrix uses written Standard Operating Procedures (SOPs) derived from methodology specified by the United States Environmental Protection Agency, other federal and state agencies, and professional compendia.

When requested by the client, samples for analyses outside the analytical scope of TriMatrix can be subcontracted to another laboratory. Unless specified by the client, samples will be subcontracted to a NELAP accredited or ISO-17025 certified laboratory.

3.8.2 Laboratory Certification - Federal, State, and Independent

TriMatrix has been formally recognized for its commitment to quality. The laboratory maintains certification through various federal agencies, as well as several state regulatory agencies and private entities. As required by most of the programs, including NELAP and A2LA, certification and accreditation claims must be made in such a manner as to not imply certification or accreditation beyond that given on the laboratory's actual scope of accreditation. Generic certification or accreditation claims must not be made. The use of symbols (such as the A2LA symbol) and other forms of accreditation must always be analyte and/or method specific. Certification

programs in which TriMatrix currently participates are listed in the subsections below:

3.8.2.1 Federal Certification/Approval Programs

US Army Corps of Engineers
NELAP – National Environmental Laboratory Accreditation Program

3.8.2.2 State Certification Programs

Arkansas	Department of Environmental Quality
Florida	Department of Environmental Protection
Georgia	Environmental Protection Division
Illinois	Environmental Protection Agency
Kansas	Department of Health and Environment
Kentucky	Petroleum Storage Tank Environmental Assurance Fund
Louisiana	Department of Environmental Quality
Michigan	Department of Environmental Quality
Minnesota	Department of Health
New York	Department of Health
Ohio	Ohio VAP Program
Oklahoma	Department of Environmental Quality
Wisconsin	Department of Natural Resources

3.8.2.3 Independent Certification Programs

The American Association for Laboratory Accreditation (A2LA)

3.8.3 Proficiency Testing Studies

An integral part of most certification programs are Proficiency Testing (PT) Studies. PT studies are analyzed periodically as external "blind" or "double blind" spiked samples containing specific (known only to the administrators of the study) concentrations of target analytes. The laboratory reports the results to the agency or firm administering the PT study. The administrator then evaluates the laboratory's performance based on a comparison of the reported values with the known analyte concentrations. Laboratory results are scored and reports are prepared by the study administrator. The reports are submitted to the laboratory, certifying programs, and agencies or private entities that subscribe to the program.

TriMatrix routinely participates in the following proficiency testing programs:

- Water Supply (WS) Study
- Water Pollution (WP) Study
- Soil PT Study
- USEPA DMRQA

3.9 LABORATORY FACILITIES, EQUIPMENT, AND SUPPLIES

3.9.1 Physical Plant

3.9.1.1 Laboratory Demographics

The current TriMatrix Laboratories facility, located at 5560 Corporate Exchange Court SE, Grand Rapids, Michigan, was constructed in 1999. The 20,000 square foot structure was designed predominantly by the laboratory staff, with careful consideration given to the strict analytical testing requirements of today's environmental marketplace. Special attention was given to the sample preparation areas and the segregation of non-

compatible areas such as semi-volatile and volatile organics. Samples are stored according to type, with a large centrally located walk-in cooler used for the storage of all non-volatile, non-hazardous waste samples, to which both the sample receiving personnel and the laboratory staff have ready access. Quiet office areas were also built in, to provide space for data review, report compilation, and technical review discussions. A breakdown of each general area of analysis and the space allocated is as follows:

Laboratory Area	**Space Allotted, ft^2**
Wet Chemistry/Microbiology	Approx. 2000
Atomic Absorption/Emission	Approx. 2000
Volatile Organics	Approx. 1600
Semi-Volatile Organics	Approx. 2300
Sample Processing & Storage	Approx. 2400
Administrative Offices	Approx. 4200
Organic Pretreatment	Approx. 1300
Miscellaneous Space	Approx. 4200

The attached facility layout (Figure 3-6) shows the general lab areas and other space allocations.

Access to all laboratory areas including sample storage, sample container preparation, sample preparation, sample disposal, documents storage and clients files are secured. Non-authorized personnel may enter these areas only if escorted by a laboratory staff member.

Project initiation, sample control, and analysis, are all controlled using a Laboratory Information Management System (LIMS).

Under the direction of the Laboratory President, TriMatrix is organized into the following operating areas and support services.

Laboratory Administration

Client Services

Data Management

Sales/Marketing

Project Management

Health and Safety

Quality Assurance

Computer Services

Analytical Operations

Inorganic Laboratory

- Metals Laboratory
- Non-Metals Laboratory

Organic Laboratory

- Volatile Organic Laboratory
- Semi-Volatile Organic Laboratory
- Organic Extraction Laboratory

(Refer to Figure 3-2 for a graphical representation of the Laboratory Organization Chart)

3.9.1.2 Reagent Water Systems

Laboratory water originates from the Grand Rapids potable water distribution system. At the laboratory, the water is softened and passed through an activated carbon filter to remove residual chlorine. The water then enters a reverse osmosis system where approximately 90% of the dissolved constituents are removed. The water is temporarily stored in a 120 gallon holding tank until demand activates a mechanical pump that transfers the water through two mixed bed deionizing canisters. This water meets the requirements of ASTM Type II, and is utilized for glassware cleaning and as a feed-water to a variety of polishing systems.

The polishing systems are comprised of a distillation unit and a Milli-Q 4 Bowl System. Distilled RO-Deionized water is used primarily for BOD and metals analyses. Mill-Q water, which is equivalent to an ASTM Type I designation, is primarily used for the preparation of standard solutions and reagents.

Each water system is periodically monitored for specific quality requirements. Monthly, heterotrophic plate count and total residual chlorine analyses are performed. Weekly, the water system itself is checked for operational readiness and a hardness test is performed. Daily, additional readiness checks including a conductivity test are performed.

Responsibility for monitoring the TriMatrix reagent water systems is carried out by the Quality Assurance Department and personnel in the inorganic wet chemistry laboratory.

3.9.1.3 Ventilation Systems

The laboratory ventilation system was specifically designed to minimize or eliminate airborne contamination. Externally, the air conditioning unit intakes were located taking into consideration prevailing wind patterns, positioning them upwind of the fume hood exhaust stacks. Taking into account wind-shifts, the exhaust stacks were equipped with high velocity fans to disperse potential contaminants well above the building. Internally, the air-handling systems controlling heating, cooling, and humidity, also maintain maximum cfm air turnover. Additionally, the air-handling systems are monitored and controlled via a NOVAR computer controller.

3.9.1.4 Compressed Air

Compressed air must be free of dirt, water, and oil. Compressed air purchased from vendors is high purity grade (breathing air).

Compressed air produced in the laboratory uses filters at the compressor to remove water from the delivery lines. For the gas chromatographs and atomic absorption spectrophotometers, additional filters are located on the instrument to remove any residual oil at the point of use.

3.9.1.5 Electrical Services

The electrical system in use at TriMatrix was designed specifically for a laboratory environment. Special attention was paid to instrument requirements, including the isolation of separate lines for critical applications like GC, GC/MS, atomic absorption, and automated analyzers.

All laboratory benches, hoods, and work areas were designed with sufficient outlets to accommodate a variety of laboratory applications, such as distillations, digestions, and extractions.

Surge protection devices are in place for all laboratory computing equipment. The laboratory LIMS system is also protected by an Uninterrupted Power Supply (UPS). This UPS allows for a sequenced shutdown of the LIMS system during a power failure. This sequenced shutdown provides excellent protection of the LIMS database during a power interruption.

3.9.2 Equipment, Supplies, and Chemical Procurement; Reception, Storage, and Inventory

For an environmental testing laboratory where trace analyses are routinely performed, certain specifications for laboratory equipment, supplies, and chemicals are critical to quality. A minimum specification for accuracy and precision of equipment such as analytical instrumentation, balances, glassware, and water baths is required for each analytical procedure. The Technical Director in conjunction with the Laboratory President and laboratory area

managers are responsible for determining minimum specifications before equipment is procured. The analytical specifications are based on a detailed review of the test methods. Purchasing is coordinated through the purchasing department. Records are maintained on all vendors exhibiting poor performance on either their service or product. Relationships will be terminated with any vendor whose records indicate sub-standard performance.

3.9.2.1 Equipment Management/Maintenance/Inventory

A sufficient inventory of equipment is maintained to prevent testing delays resulting from equipment failure. Service is performed on equipment on a scheduled basis. A stock supply of spare parts that are known to wear out regularly is maintained.

Adequacy of equipment for its intended purpose must be verified before use. Maintenance logbooks are kept to document maintenance procedures on major equipment, allowing preventive maintenance frequency and requirements to be determined. Maintenance procedures are discussed in the various analytical SOPs.

A complete listing of Laboratory Equipment is presented in Appendix C of this manual.

3.9.2.2 Glassware

Only glassware providing the required precision is used for a particular analytical procedure. TriMatrix purchases Class A pipets, burettes, and volumetric flasks, to meet this specification. A standard operating procedure is utilized for cleaning each type of glassware. Cleaning of glassware is performed according to the analysis being conducted and the sample matrix involved, but certain general rules apply to all glassware washing procedures:

- Use hot water to wash away water-soluble substances.
- Use detergent, dichromate solution, organic solvent, nitric acid, or aqua regia to remove other materials according to the specific glassware cleaning procedures.
- Avoid using detergents on glassware to be used for phosphate determinations.
- Use ammonia-free water for ammonia and kjeldahl nitrogen analyses.

For all analyses, it is advisable to rinse glassware with tap water followed by deionized water immediately after use, as residue allowed to dry on glassware is more difficult to remove.

3.9.2.3 Reagents, Solvents, and Gases

Purchasing of reagents, solvents, and gases are carefully controlled through an ordering system that maintains a minimum level of quality in the testing process. The Quality Assurance Department defines the suitable grades of ordered materials. Designates from each laboratory area verify upon receipt that incoming materials meet these requirements. Certificates of Analysis are forwarded to the Quality Assurance department where they are scanned and stored. Each laboratory area will monitor the proper storage and the eventual removal of reagents, solvents, and gases, when their shelf life has expired. All consumable reagents and chemicals must be labeled with the date received to ensure a First-In-First-Out (FIFO) system of use.

Reagents, solvents, and gases are available from vendors in a broad range of purity, from technical to ultra pure grades. The analysis, as well as the sensitivity and specificity of the method, must be considered when choosing a grade. Analytical reagent (AR) grade is suitable for most inorganic analyses. Trace organic analyses frequently require ultra pure grades. AR grade is the minimum

approved for reagents used in organic analysis. The absence of certain impurities is required for some GC detectors - notably sulfur and phosphorus in an FID detector. Trace metals analyses including atomic emission and atomic absorption spectroscopy usually requires spectro-quality reagents, although AR grade may be suitable in some cases. Florisil, silica gel, and alumina used as absorbents in organic extract cleanups, must be checked for interfering components and activated according to the analytical method. Compressed gases are available in various purities, usually expressed as a percent (e.g. 99.999). Gases are filtered in the laboratory delivery lines to remove moisture, oil, and other contaminants. Refer to the analytical method and instrument manufacturers operating manual for gas purity requirements.

Shelf life of purchased chemicals is based on the following guidelines (unless otherwise specified by the manufacturer or derived from the analytical procedure):

Inorganics

Liquids – 5 years
Solids – 5 years
Prepared solutions – Stocks 1 year, working 6 months

Organics

Liquids – 2 years
Solids – 5 years
Prepared solutions – Stocks 1 year, working 6 months

Unpreserved ethers have an expiration date of 34 days due to the potential for peroxide formation.

3.9.2.4 Certified Standards

The purity and traceability of standards used in the analytical process is crucial to the quality of the data generated. Only high quality standards certified by established vendors are to be utilized. Calibration standards must be of the purity required by the method for a particular analysis.

Upon receipt all purchased standards are entered into the LIMS system and labeled with a unique identifier and an expiration date. The date received is also recorded on the container. Stock and working standards are likewise labeled.

All calibration standards are validated against a second source standard. A second source standard is analyzed with every initial calibration. The quantitated value is compared to laboratory established limits. Recovery must fall within these limits for the calibration and calibration standard to be considered acceptable. Stock and working standards are also monitored for visible signs of deterioration (precipitates, color change, volume change).

Vendor expiration dates for purchased stock standards must not be exceeded. Expiration dates for laboratory prepared standards are based on guidelines in the analytical method, generally 6 months for working, and 1 year for stock standards.

3.9.2.5 Chemical / Reagent Storage

Bulk chemicals and reagents are stored in a several locations and under a wide variety of conditions within the laboratory. Specific storage conditions for many reagents are presented in each laboratory testing SOP. Additional storage information is referenced in both the TriMatrix Laboratory Safety Manual and the TriMatrix Chemical Hygiene Plan. For general purposes, the following storage conditions are used:

Chemical /Reagent Type	General Storage Requirements	Location/Lab Area
1) Bulk Dry Chemicals	Dry Chemical Storage Cabinets	Inorganic Laboratory
2) Inorganic Acids	Vented Acid Storage Cabinets	Metals Laboratory
3) Organic Solvents-Flammable	Vented Flammable Cabinets	Inorganic & Prep Laboratory
4) Organic Solvents-Nonflammable	Vented Storage Cabinets	Inorganic & Prep Laboratory
5) Compressed Gases	Secured Gas Storage Area	Garage & Outside Storage
6) Bacteriological Materials	Reagent Refrigerator	Inorganic Laboratory
7) Aqueous Standards	Reagent Refrigerators	All Laboratory Areas
8) Organic Standards-Flammable	Explosion Proof Refrigerators and Freezers	Organic Laboratory Areas
9) Organic Standards-Nonflammable	Standards Refrigerator & Freezers	Organic Laboratory Areas
10) Sample Extracts	Extract Freezers	Organic Laboratory Areas
11) Digestates-Metals	Vented Acid Storage Cabinets	Metals Laboratory

3.10 TRAINING

Proper training of laboratory personnel is an essential part of staff development. Documentation of these training procedures provides a record of training activities completed, and serves as a guideline for continual staff development. All personnel concerned with testing and evaluation activities conducted by the laboratory must familiarize themselves with the laboratory's quality documentation and implement the stated policies and procedures in their work.

Personnel training files contain all the documents related to the development of each laboratory employee. Contained within these files are in-house training documents, external training program certificates, safety training records, fraud and ethics training records, and other materials directly related to individual capabilities. The quality assurance department maintains all training files.

3.10.1 Initiation of Training Documents

The human resources department initiates a training file on a new employee's first day of employment. The new file contains the various blank training

forms used during the employee's orientation period (Appendix D). These checklist style forms provide a listing of the necessary orientation items. When completed and stored in the employee's training file they provide a permanent record of the orientation process.

3.10.2 Code of Ethics/Data Integrity Policy Agreement Form (Appendix E)

It is the intent of TriMatrix to always issue data of consistently high quality. For this to be possible, employees must be educated as to what that level of data quality is, and they must be provided with an environment conducive to its achievement. Besides for providing employees with the supplies and equipment necessary to properly perform their assigned tasks, the work environment maintained must remain free from work-related undue pressures that could lead to a compromise in the quality of work performed. Sources of such pressure may be internal (peer pressure or deadlines), or external (customer complaints or priority requests). It is the responsibility of management to insulate employees from these pressures. It must be clear that data quality cannot be compromised for any reason, and an employee will not be reprimanded in any way for adhering to established quality protocol.

During a new employee's meeting with human resources, these policies will be explained and the employee asked to review and sign a Code of Ethics/Data Integrity Policy Agreement Form. This form documents the understanding between management and the employee concerning management's position on data quality, the implications of improper actions involved in sample analysis and data reporting, and the consequences of these improper actions. The form will be retained in the employee's training file.

3.10.3 Additional Documentation

All essential laboratory documents are stored on the laboratory's intranet drive. During orientation a new employee will be shown how to access these documents and instructed on which ones are required reading. Some of the required reading documents include the laboratory's Quality Assurance

Manual, Chemical Hygiene Plan, Safety Plan, Employee Handbook, a memo containing instructions on TriMatrix error correction policies, and instructions on computer usage at TriMatrix. Training files are kept documenting that the employee has read and understood these documents.

3.10.4 Demonstration of Capabilities (DoC, IDC, CDC)

All analysts and instruments used for sample analysis must analyze at least one type of Demonstration of Capability (DoC). Three types of demonstrations exist, a method/instrument DoC, an analyst Initial Demonstration of Capability (IDC), and an analyst Continuing Demonstration of Capability (CDC). All demonstrations are documented, reviewed, and validated in each analyst's training file, in accordance with the procedures outlined in the TriMatrix SOP for analyst training. All supporting data necessary to reproduce the DoC, IDC, or CDC must be available. Sample analysis may not begin prior to the successful completion of an appropriate DoC, and the submission of the associated paperwork to the Quality Assurance Department.

3.10.4.1 Method/Instrument DoC

Prior to the acceptance and institution of any Standard Operating Procedure, or the use of any new instrument, a satisfactory demonstration of the method/instrument capability is required. This DoC must be performed on all instruments utilized for sample analysis. This is a one-time procedure, unless there is a significant change in the instrument or methodology. This procedure must be successfully completed for all applicable matrices prior to the analysis of any samples. An instrument DoC consists of a Demonstration of Linearity or Accuracy, and a Method Detection Limit Study (MDL); two separate studies demonstrating the instrument's capability of producing acceptable results.

1) Demonstration of Linearity or Accuracy

For methods that utilize an initial calibration, an acceptable initial calibration will serve as the demonstration of linearity. The low point of the calibration must be at or below the lowest desired reporting limit. The high point defines the linear range, as any sample with an analyte concentration quantitated above this level will require dilution. For procedures not using a calibration curve, seven standards at various concentrations covering the range of the instrument must be analyzed to demonstrate linearity. These standards must be prepared from the same source as that used for calibration. The standard deviation of the average recoveries must be less than 20% RPD, and the average percent recovery must be between 95% and 105%. The spreadsheet and form shown in Appendices F and G must be used to document the linearity test. Return these completed forms to the Quality Assurance Department.

2) **Method Detection Limit study (MDL)**

A Method Detection Limit (MDL) study is performed in accordance with 40 CFR; Part 136; Appendix B. All MDL studies are performed on both soil and reagent water (as applicable), and are updated annually or whenever major changes are made in an analytical procedure. The MDL procedure is described in section 3.11.2.

3.10.4.2 Analyst IDC

Each analyst involved in the pre-treatment or analysis of samples must first pre-treat or analyze a successful IDC. The IDC, unlike the DoC, is not instrument dependent. An IDC must be re-analyzed any time a significant change to a procedure occurs. Prepare four replicate LFBs (for procedures with pre-treatments) or four replicate LCSs (for procedures without pre-treatments) at a concentration in the lower half of the linear range. The spiking

standard must be prepared from a source dissimilar to that used for quantitation. For procedures where analyte spiking is not an option, the acceptable analysis of a single blind PT sample will suffice. Alternatively, an analyst may analyze four replicates of a sample against a concurrently analyzed replicate set by an experienced analyst.

Analyze the four spikes, PT sample, or sample replicates, following the analytical procedure. The four analyses may be performed concurrently or over a period of days. Enter the data from the spikes into the spreadsheet shown in Appendix H, or the eight sample replicates into the spreadsheet in Appendix I. The spreadsheet calculates the mean percent recovery and the relative standard deviation of the average, and compares them to acceptance criteria in the spreadsheet. If both the precision and accuracy requirements are met for all analytes tested, the analysis of actual samples may begin.

When one or more analytes fail the precision or the accuracy requirement, performance is deemed unacceptable for those analytes only. If possible, locate and correct the source of the problem. Repeat the analysis of the four replicates for the failing analytes only. If none of the options presented above are possible (such as with TCLP pre-treatments), an analyst must perform and submit an acceptable blank pre-treatment/analysis.

When finished, forward the completed spreadsheet, the NELAC Demonstration of Capability Certification Statement (Appendix J), the Laboratory Training Checklist (Appendix K), the MDL study when necessary (Appendix L), or the PT results to the Quality Assurance department.

3.10.4.3 Analyst CDC

Annually, a Continuing Demonstration of Capability (CDC) is required of all analysts. In addition to the procedures described in section 3.10.4.2, a CDC may be accomplished by processing the last four runs of an MDL study, or four *consecutive* previously analyzed LFB/LCSs as an IDC.

When complete, forward a copy of all applicable data necessary to reconstruct and validate the study to the Quality Assurance department.

3.10.4.4 SOP Revision Laboratory Training Checklist

SOPs are periodically reviewed and updated. When an update is released, the appropriate form from Appendix M must be completed to record that the applicable analysts have read, understand, and will follow, the revised SOP.

3.10.5 Continuing Training and Education

TriMatrix is committed to education and training on a continuing basis for employees of the laboratory sections. There are various ways in which continuing training can occur, including:

- seminars
- cross-training for additional job responsibilities
- retraining
- method and technology updates

3.11 DETECTION LIMITS

The process of quantifying an analyte in an environmental matrix using specific analytical procedures must use detection limits as points of reference. The three levels of analyte signal as generated by an instrument are separated by detection limits as described below.

3.11.1 Instrument Detection Limit - IDL

The IDL distinguishes the level of instrument noise from the level of analyte signal. The IDL is defined as the smallest signal above background noise that an instrument can detect statistically. The IDL is measured by analyzing replicate reagent grade waters as the study matrix. Seven consecutive measurements are performed at 3-5 times the required detection limit concentrations on three non-consecutive days. The IDL is calculated by multiplying the standard deviation average of the measured values by three. The IDL will vary from one instrument to another and must not be used as a reportable detection limit (Figure 3-7). IDLs are determined quarterly for trace metals analyzed by ICP and ICP/MS.

3.11.2 Method Detection Limit - MDL

The MDL separates the region of signal detection from the region of qualitative (semi-quantitative) determination (Figure 3-7). It is defined as the minimum concentration of a substance that can be detected and reported with 99 percent confidence that the value is above zero. The MDL is determined similarly to the IDL but is based on spiked blanks having gone through the entire sample preparation scheme. MDL studies are run for both waters and soils. An MDL study must be performed for every analyte quantitated using the procedure. Any result obtained for an analyte where an MDL has not been calculated must be considered estimated.

Minimum quantitation limits are derived from the MDL study. Provided the MDL study passed, minimum quantitation limits are set equal to the amount of analyte spiked in the MDL study; however, the minimum quantitation limit actually achieved in any sample analysis will vary depending on instrument sensitivity, matrix effects, and dilutions.

The method followed in determining an MDL is that described in 40CFR Part 136 Appendix B, where seven replicate aliquots of reagent water or blank sand

are spiked with every analyte of interest at the estimated minimum quantitation limit concentration. The estimated minimum quantitation limit concentration is generally 2 to 5 times the MDL, and can be approximated from the response of spiked blanks carried through the entire analytical process, or a calibration curve. If the criterion for qualitative identification of the analyte is based upon pattern recognition techniques such as PCB analysis, the least abundant signal necessary to achieve identification must be considered in making this estimate. It is essential that all sample processing steps and analytical quality control procedures be included in the process of determining an MDL. Make all computations according to the defined procedure.

To calculate the MDL, the standard deviation of the average found for each analyte of all seven runs is determined and multiplied by the student T value of 3.143. The resulting number is the MDL value.

For the MDL study to be acceptable, the amount spiked must be greater than or equal to the calculated MDL, and less than or equal to five times the calculated MDL. Additionally there must be no zero percent recoveries in the set of seven. If these criteria are met, the MDL study is acceptable. If not, the MDL must be re-analyzed, but only for compounds that did not pass. If a study fails due to an obvious pre-treatment or analytical error, it is acceptable to perform a re-analysis on only that one sample. All seven analyses do not need to be analyzed in the same analytical batch.

Once the MDL has been determined it must be verified. This is accomplished by preparing a spiked blank at approximately 2 times the calculated MDL. The spiked blank is carried through the entire pre-treatment and analysis procedure. If the response of the verification spike is greater than or equal to three times any response found in the blank, the MDL verification is acceptable. The MDL value may be used as is. If it is not, a higher concentration spiked blank must be prepared and analyzed. Repeat this process until the verification spike passes. The MDL must be elevated accordingly.

Appendix L shows an example of an MDL spreadsheet used to calculate and verify MDLs and quantitation limits. MDLs for all analytes, in both water and soil, must be determined annually, or whenever a significant modification is made to the procedure.

3.11.3 Practical Quantitation Limit - PQL

The PQL is defined as the minimum concentration of an analyte that can be reliably measured (vs. detected) within specified limits of precision and accuracy, under normal laboratory operating conditions. The PQL separates the region of qualitative (semi-quantitative) determination from the region of quantitative determination (Figure 3-7). Typically the PQL for an analyte is the concentration at which an acceptable MDL study was run, normally 3-10 times the calculated MDL.

3.12 PROCEDURES FOR ACCEPTING NEW WORK/TESTS

3.12.1 New Test Requests, Development, and Approval

Client Services must submit a request for new analyses to each impacted laboratory area where the request will be formally processed. Evaluation of the request will include the suitability of the analyte for quantitation, availability of existing test methods, instrumentation, capacity, standard materials, etc. The Vice President of Laboratory Operations, Technical Director, and/or Group Leader will provide a prompt response to client services to ensure client needs can be addressed.

All newly developed procedures are reviewed by the laboratory Technical Director and must comply with all requirements outlined in section 3.10.4.

Figure 3-1
Quality Control Chain of Command Flow Chart

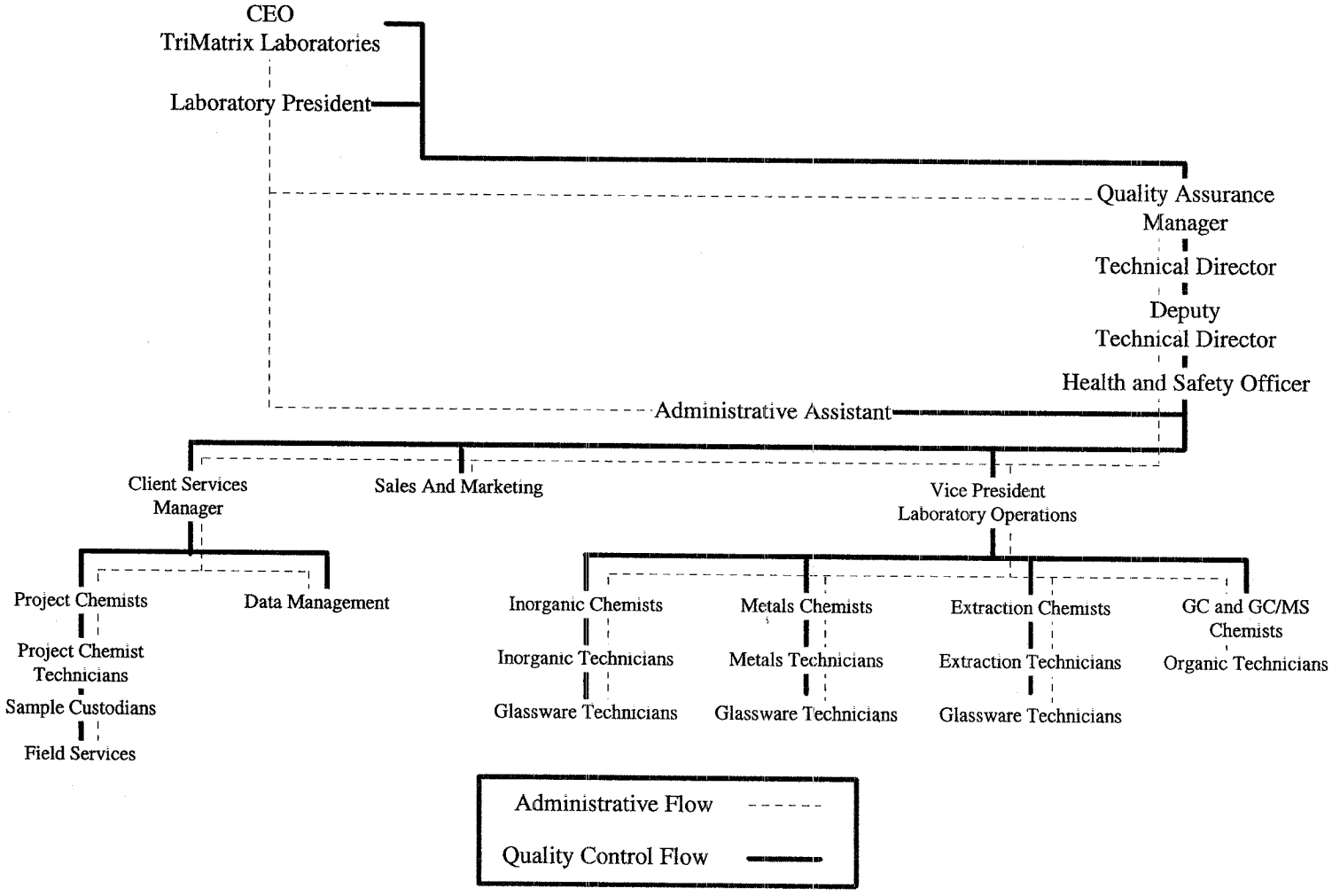


Figure 3-2
Organizational Chart

TriMatrix Laboratories, Inc.

January 2007

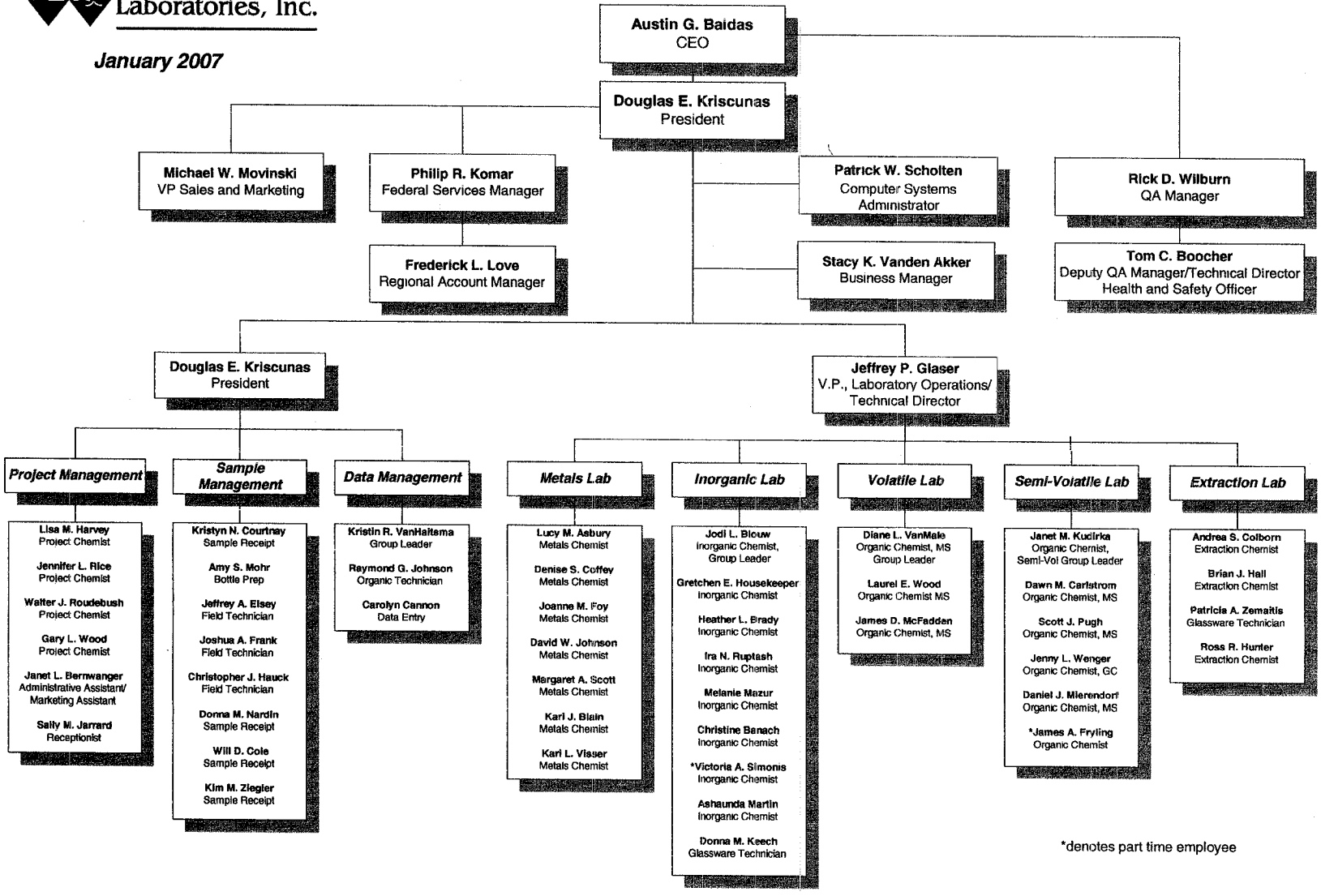


Figure 3-3
RELATIONSHIPS
Management to Technical Services

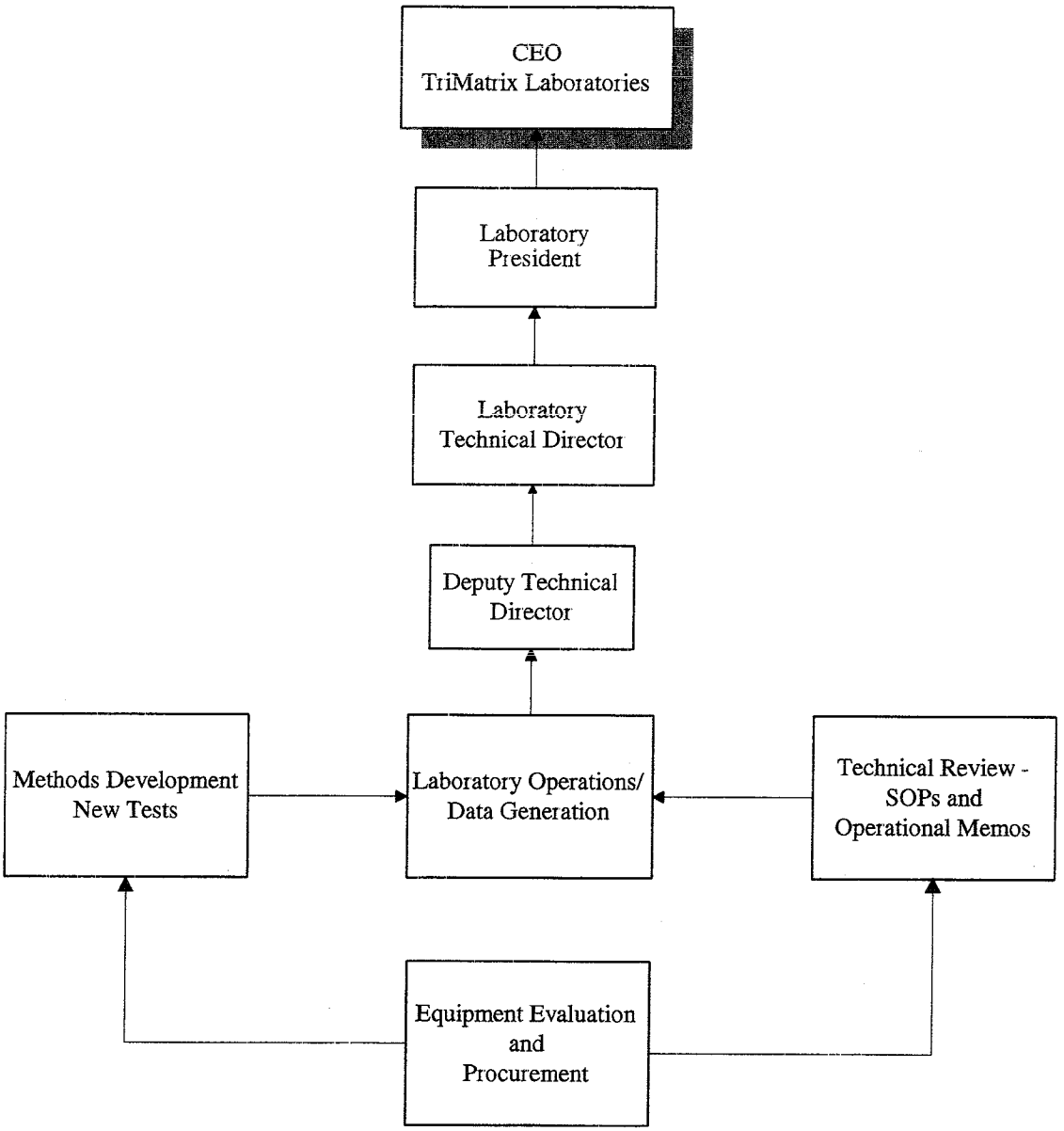


Figure 3-4
RELATIONSHIPS
Management to Support Services

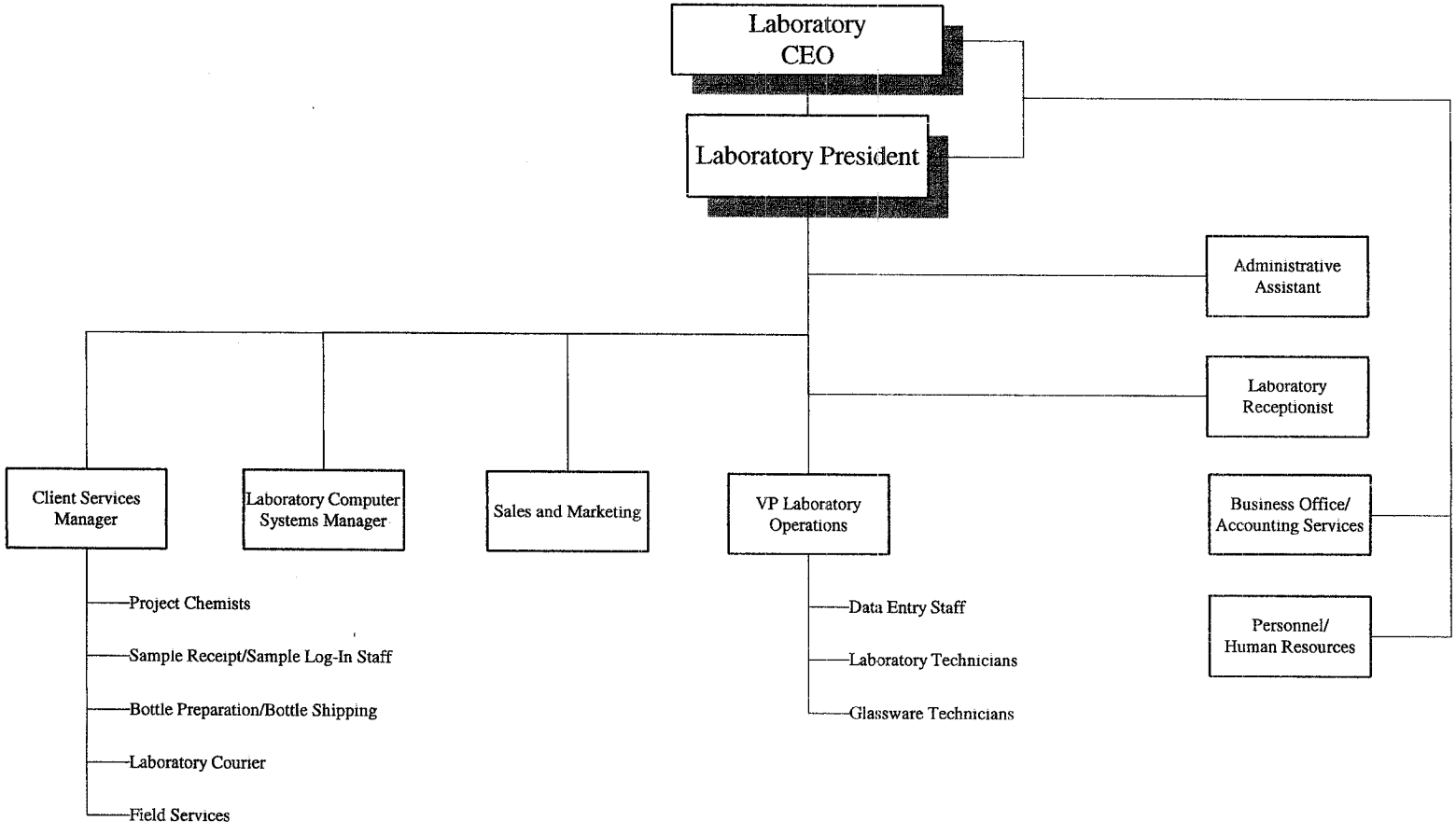


Figure 3-5
RELATIONSHIPS
Management to Quality System

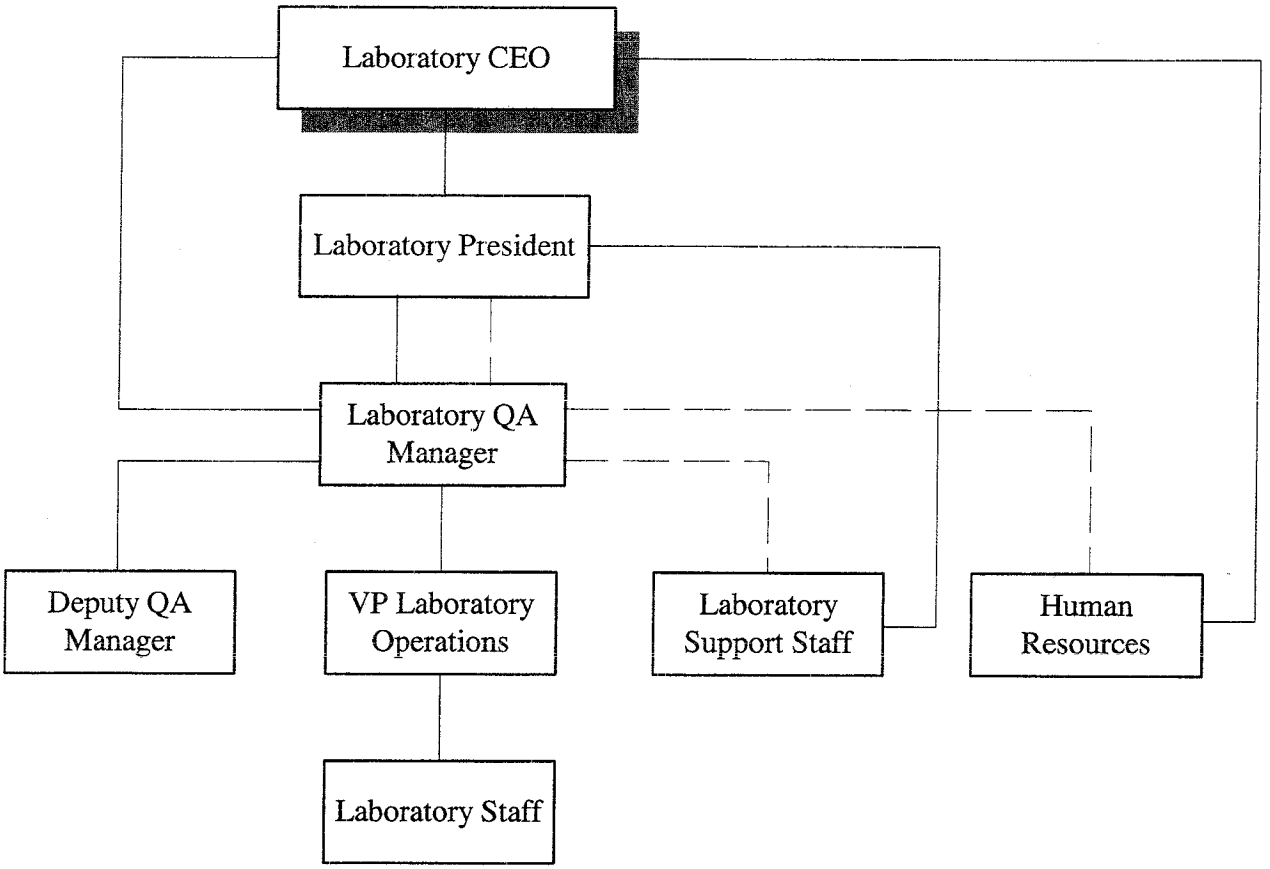


Figure 3-6
Laboratory Layout/Diagram

TriMatrix Laboratories, Inc.
5560 Corporate Exchange Court
Grand Rapids, Michigan 49512

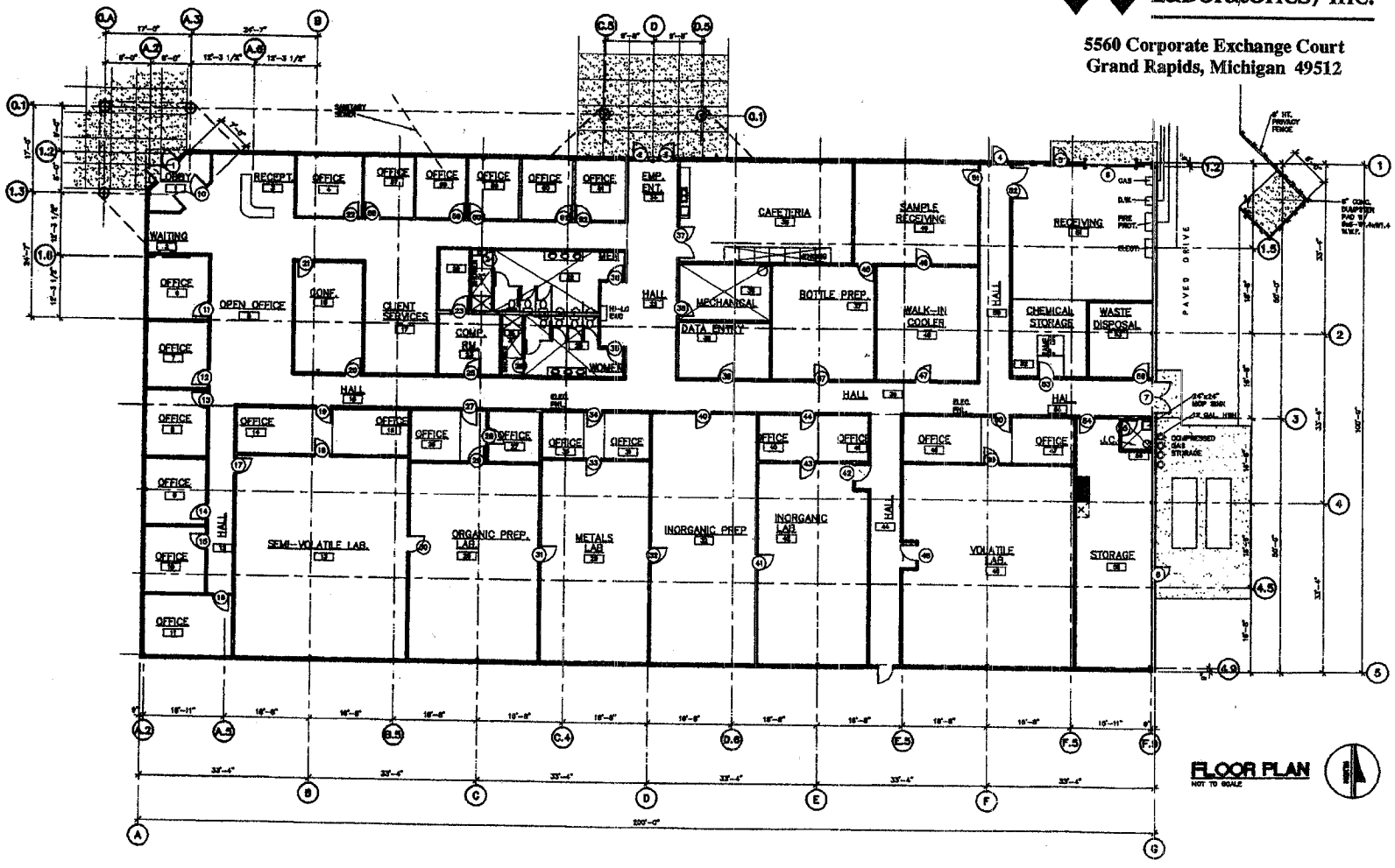
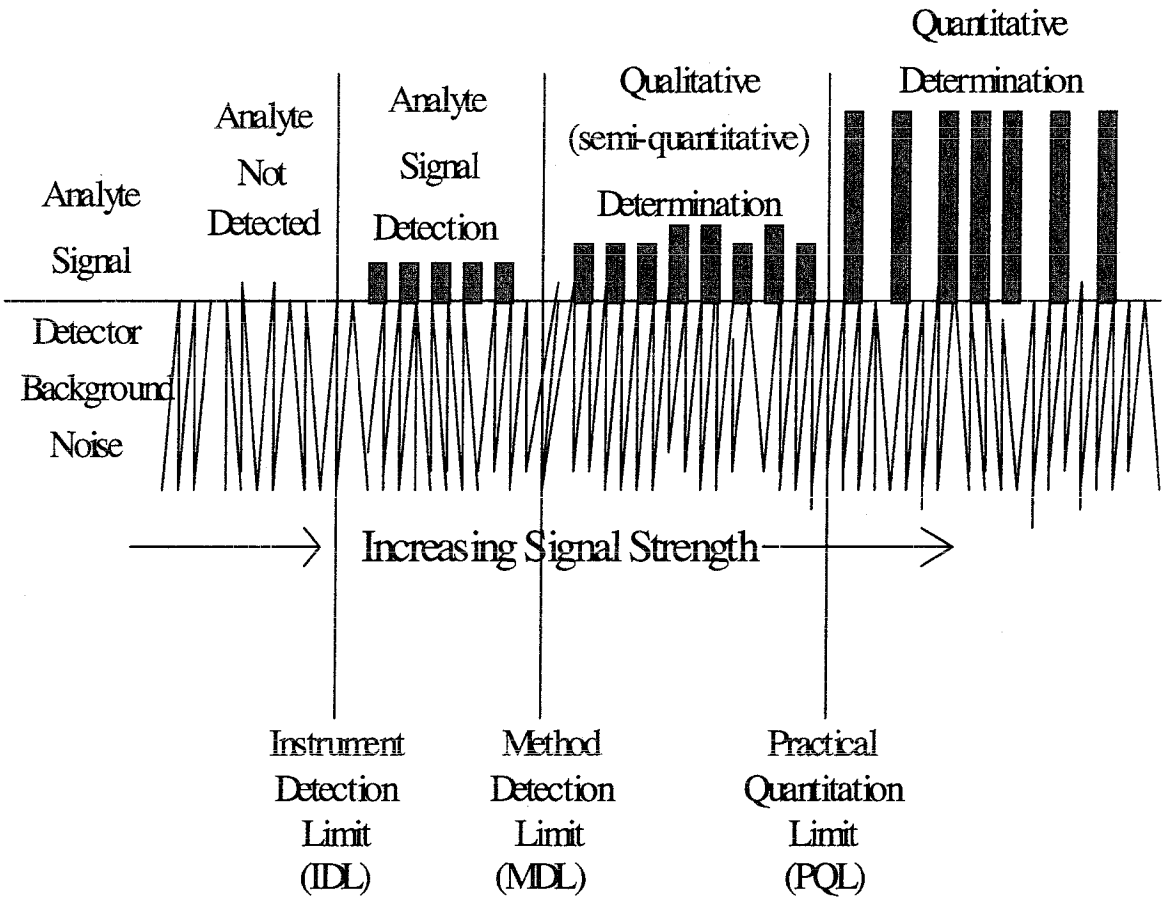


Figure 3-7
Regions of Analyte Signal



4.0 QUALITY CONTROL

4.1 DOCUMENT CONTROL AND MAINTENANCE

4.1.1 Procedures for the Control and Maintenance of Documentation

All documentation that forms part of the quality system are subject to strict control regarding their creation, revision, approval, use, and distribution. This applies to documents generated both internally, and those received from outside sources. Obsolete documents that are retained in circulation for either legal or knowledge preservation purposes are marked as "obsolete". The structure of the documentation used in the TriMatrix quality system is presented in Figure 4-1.

4.1.1.1 Internal Documentation

Examples of internal documentation include Standard Operating Procedures, the Quality Assurance Manual, and miscellaneous forms and logbooks. All documents must be reviewed and approved by one or more senior staff prior to their use. All documents will print with both the file name and revision number. Additionally, all logbooks are bound and paginated.

All approved documents are stored on the laboratory intranet read only drive designated as "Library." Document control is maintained through the use of the laboratory computer network. By maintaining only the current version of an approved document on the Library drive, document control and security is maintained. This procedure provides immediate access to the latest revision of all documents.

It is acceptable to make minor hand edits to certain documents such as Standard Operating Procedures. Document amendments may be made by any applicable, qualified, laboratory employee,

however; all hand amendments must be approved by, and distributed through, the Quality Assurance Department. All hand amendments must be legible, and recorded in ink. All hand amendments must be dated and initialed. All hand amendments must be incorporated into the next revision of the document. Hand amendments cannot be used for major document revisions. The document should instead undergo a formal revision. The QAM is reviewed annually and updated as necessary.

All logbooks are turned in to the front office when complete. They are assigned a document control number and scanned. The resulting .pdf file will be stored on the Library drive where it will be accessible to all employees. When possible, scanned copies of all methods and manuals are stored on the library drive.

4.1.1.2 External Documentation

Examples of external documentation include regulations, analytical methods, QAPPs, and client required minimum standards. These documents are maintained and distributed by the quality assurance department. Instrument manuals, instructions, and requirements, are controlled by the individual laboratory areas.

4.1.2 Traceability of Measurements/Documentation Requirements

The purpose of a properly designed and implemented documentation protocol is to assure that after the issuance of an analytical report, all information presented can be fully traced back to its point of origin. This documentation system must also provide for traceability of non-reported information that provides supporting value to the analytical test result. These items include but are not limited to: stock standard records, test calibration records, data reduction and validation activities, sample custody, facilities monitoring, and final data reporting.

A more detailed review of the documentation procedure and traceability of information is presented in the following sections.

4.1.3 Paperwork/Information Flow

As displayed in Figure 4-2, the flow of documents is the same for routine work as it is for samples under strict chain-of-custody (COC). The general axiom is that a COC procedure will fail without a pre-existing scheme of rigid documentation control available. The records trace can provide for the following:

- Answers to questions of analytical integrity
- Assistance in finding and solving random and systematic problems
- Assistance in preventing long term degradation of the analytical process
- Assistance in ensuring continuity of analytical effort despite personnel and mechanical changes

The following subsections identify and describe the procedures followed, and the corresponding documents generated, from the time a project is initiated through its completion.

4.1.3.1 Project Initiation

All samples or sample groups that enter into the analytical process must be accompanied by the appropriate documentation. This documentation is necessary to define the analytical goals and project objectives. Information concerning analytes, reporting limits, and reporting formats must be provided. An inventory of required sample containers must be prepared for each sampling event. This inventory is prepared on a Container Packing List (Appendix N).

All projects are initiated through the LIMS system. All documents created during the project initiation phase are maintained and archived to the client filing system.

4.1.3.2 Sample Receipt/Examination

The receipt of all sample shipping coolers (empty or full) will be documented in the Sample Receipt Record Logbook (Appendix O). This logbook documents the delivery method, date, and time, the number of coolers received, the client, and the name of the TriMatrix employee who received the cooler. This information is entered into the logbook immediately after drop-off.

Observations on the receipt of each sample delivery group, including sample temperatures, are documented on the "Sample Receiving/Log-in Checklist" (Appendix P). This form was designed in a step-by-step format to walk the log-in technician through all the steps required when receiving and logging-in samples. A supplemental "Sample Receiving/Log-in Checklist Additional Cooler Information" form is available when receiving projects consisting of more than four coolers (Appendix Q).

Additional forms to document sample preservation, "Sample Preservation Verification Form" (Appendix R), and non-conformances, "Sample Receiving Non-Conformance Report" (Appendix S), are also completed.

4.1.3.3 Sample Log-In

During log-in, a series of computer entry functions are performed in an effort to document and validate the log-in process. The remainder of the Checklist is also used to record the completion of the various steps that must be followed when logging samples into the LIMS system. Once complete, bottle tags are produced and a

Work Order generated (Figure 4.3 and Appendix T). The log-in technician will initiate a project or submittal file for each sample delivery group received. This file is labeled with the LIMS system generated project-submittal sequence, and will contain all documents associated with the sample receiving/sample log-in process. These documents will include: all external chain-of-custody forms, sample preservation records, shipping records, any client correspondence and a copy of the actual log for each submittal. Upon completion of the analytical process, the project file becomes part of the permanent record of each project.

4.1.3.4 Worklists/Benchsheets

The worklists and benchsheets produced by the TriMatrix LIMS system are designed to provide the analyst with essential project information. This information not only includes client/project specifications, but also provides an avenue for communication of test specifications and parameter expiration dates and times. This up-front information enables the analyst to make vital decisions in their analytical scheme, and helps to minimize problems after samples are analyzed.

Examples of a laboratory worklists and benchsheets are presented in Appendix U.

4.1.3.5 Management Reports

Several reports are provided within the TriMatrix Laboratory system to help monitor operational conditions of the laboratory. These reports include: workload reports, on-time reports, and aging logs.

The flow of information from these various reports is geared to a variety of personnel within the management structure of the

laboratory, and to specific persons outside the laboratory. Information is generally provided to employees external of the laboratory for corporate management decisions or in providing information to a particular client about their project.

Examples of management reports are presented in Appendix V.

4.1.3.6 Quality Assurance Reports

Quality assurance reports play a vital role in the management of the quality system. Quality systems must be closely scrutinized in order to monitor, maintain, adjust, and add, procedures or systems to meet existing and new QA objectives of the laboratory.

Several quality assurance reports are created in this effort. These reports serve different functions and are designed to inform the ultimate user. In the case of a client/invoice report, the quality assurance data is presented to facilitate the objectives of the project requirements from data assessment through full 3rd party data validation.

Quality control reports are also used within TriMatrix to monitor the analytical process and to provide a means by which this analytical process can be viewed over time. These reports range from internal audit reports to management, to standard control or SQC charts. It is the responsibility of the quality assurance staff to compile, monitor, and maintain the necessary quality control reports, which will allow both management and the laboratory staff the means to monitor the control of all analytical data. Examples of efforts available for this monitoring process are presented in Appendix W.

Quality control reports are used extensively by the laboratory to access the analytical process. All QC reports are created through

the TriMatrix LIMS system. Many of these reports are utilized daily to monitor all aspects of quality control, i.e., method accuracy, precision, completeness, and to provide the means for overall data assessment at the batch level.

Many options are available through the TriMatrix LIMS system in creating each type of report.

4.1.3.7 Project Files

The project file is the comprehensive record of every project completed at TriMatrix. Project files are stored in secure filing cabinets. Items typically retained in a project file include:

- Initial project report/analysis plan/proposal
- All correspondence or documents mailed or received with the samples
- Written record of client phone conversations
- All sample receiving/log-in forms
- Chain-of-custody forms
- Laboratory worksheets
- Copy of the invoice

To save paper and file space, copies of final reports are typically not retained as they can be regenerated on demand. Projects that require a deliverables package are scanned and retained on CD.

All project files are by default stored on-site for 1 year and off-site at a secured limited access storage facility for an additional 6 years. Length of storage requirements are also determined on a client/project specific basis. If the ownership of the laboratory changes, record storage will become the responsibility of the new owner. In the event the laboratory were to go out of business, each

client will be contacted for instructions on record disposition. Client records will be transferred or destroyed as instructed.

4.1.3.8 Quality Control Documents

A) Instrument Logbooks

Two different instrument logbooks are maintained with each laboratory instrument; an instrument run-log and an instrument maintenance log. Each log plays an important role in the documentation of daily instrument activities.

The Instrument Run Logbook is used to document all analytical determinations of a designated instrument. These determinations include not only sample analyses, but also recordings of all calibration and calibration runs, quality control analyses, and where applicable, any instrument tuning activities.

The Instrument Run Logbook also provides a chronology of each day's analyses. This chronology plays an important role in the data validation process. All run logs are identified by instrument manufacturer name, model number, serial number, and the starting and ending dates encompassed. All completed run logs are issued document control numbers, inventoried, and properly archived.

The Instrument Maintenance Log is used to document instrument maintenance procedures, repairs, or modifications. All activities are documented by recording what was done, by whom, and why.

All completed maintenance logs are identified by instrument manufacturer name and model number, instrument serial number, and the dates encompassed. All maintenance logs are issued document control numbers, inventoried, and properly archived.

B) Controlled Temperature Units (CTU)

Each oven and incubator used for sample processing, and all cold sample and standard storage devices have their temperatures monitored and recorded on a daily basis. Within each CTU is a thermometer that has been checked annually vs. a NIST traceable thermometer. Additionally, each CTU used for sample storage, and incubators used for BOD and bacteriological incubation, have their weekend temperature monitored via electronic data loggers.

All temperature readings and thermometer calibrations are recorded in a Controlled Temperature Logbook. This logbook contains a page for each unit with detailed information on unit identification, serial number, laboratory location, and designated operating temperature. All CTU logbooks are issued document control numbers, inventoried, and properly archived. An example of a Controlled Temperature Log is presented in Appendix X.

C) Balance Monitoring

Each analytical and top loading balance used at TriMatrix is monitored for accuracy. All daily checks are recorded in a TriMatrix Balance Log (Appendix Y). All balance logbooks are issued document control numbers, inventoried, and properly archived.

D) Standard and Reagent Preparation Logbooks

All standards and calibration solutions used at TriMatrix are prepared, when possible, from reagents or solutions traceable to national standards. Whether a stock, an intermediate, or a working concentration, each reagent and standard solution is traceable to its origin. This is accomplished using the laboratory's LIMS system and/or a Standard Preparation Logbook (Appendix Z).

Information available on each standard includes:

- The analyte or analytes contained in the standard
- The concentration
- The solvent used to prepare the standard
- The preservative (i.e., nitric acid)
- The date of preparation
- Initials of the preparer
- The expiration date
- The unique identification number

Unique identification numbers are generated by the LIMS system and/or a book, page, and line number system. All standard and reagent preparation logbooks are issued document control numbers, inventoried, and properly archived.

E) Pipet Logs

All autopipetors utilized for the delivery of standard solutions, diluents, and reagents, are periodically checked for delivery accuracy. Because these pipetors contain mechanical parts they are subject to inaccuracies if not properly maintained and calibrated.

Daily calibrations (for pipets used to prepare standards), and weekly calibrations (for pipets used to prepare quality control samples) are recorded in a Pipet Calibration Logbook (Appendix AA). Each log is identified by manufacturer name and model number, the pipetor serial number (if available), and the starting and ending dates encompassed. All complete pipet logbooks are assigned document control numbers, inventoried, and properly archived.

4.1.3.9 Confidentiality and Proprietary Rights

Since significant amounts of information regarding the details of a client's operations are received in the laboratory, it is essential that strict confidentiality be maintained in the handling of all client information. Client data is protected in locked filing cabinets and in limited access computer files. Under no circumstances is the name of a client, or any information regarding that client, revealed to another client or to a regulatory agency without the client's written permission, under penalty of employment termination.

Any details of a client's operations that have necessarily been revealed to the laboratory for testing purposes are considered as proprietary and protected by patents, copyrights, infringement laws, or other legal constraints against disclosure.

4.1.3.10 Document Storage and Traceability

Archiving of information at TriMatrix has been designed to meet both short-term and long-term storage needs. Archives are maintained for a wide variety of data and documentation. These archives can be categorized into two main groups, a) document archives (physical documents) and b) electronic archives (data files). Table 1 illustrates the current TriMatrix archival systems, their location, and duration.

Documentation records or logs are maintained for all archival systems to aid in the quick retrieval of information. Extended archival periods or special procedures are also in place for some projects and clients.

4.1.4 Standard Operating Procedures (SOPs)

Many of the methods published today by various agencies provide only general guidance in performing an analytical determination. A significant part of the variability observed in analytical data is in large part due to minor variations in the analytical process. A Standard Operating Procedure is a guide that clearly defines the exact steps to be followed while performing a procedure. The delineation of these exact steps in an SOP will improve the analytical conditions, which in turn will help the overall reproduction of analytical data.

4.1.4.1 SOP Categories

TriMatrix Laboratory SOPs are written for almost all laboratory activities. The categories utilized in the organization of SOPs are presented in Table 2.

4.1.4.2 SOP Development, Formatting, and Review

All standard operating procedures are developed and written to the specifications outlined in the TriMatrix guidelines for the preparation of a SOP. These guidelines are presented in SOP format and have been designed to accommodate analytical tests, non-tests such as extractions or digestions, and documentation or non-analytical activities. The guidelines were developed from both USEPA and ASTM protocols for the creation of standard operating procedures.

All SOPs developed by TriMatrix are subject to a review process where signatures or approvals are required from the appropriate area manager, the quality assurance department, and the Vice President of Laboratory Operations. In addition to this overall approval process, each page of an SOP is individually approved by both the laboratory area and quality assurance department (Appendix AB).

SOPs are reviewed and updated as necessary. Minor modifications can be hand edited on the SOP. These modifications must be made through the Quality Assurance Department. Depending on the modification, distribution of the edited SOP (as described below) may or may not be required. All minor modifications will be incorporated into the next revision of the SOP. Major modifications may require the SOP to undergo an immediate formal update.

4.1.4.3 SOP Documentation and Control

All SOPs are assigned a unique procedure identifier. Other information included in every SOP is the effective date, revision number, information on the author, total number of pages and identification of any individual page revisions.

All original, approved paper copies of TriMatrix SOPs are controlled by the Quality Assurance department. Approved SOPs are scanned and stored on the network Library drive. This drive is accessible to all laboratory personnel. Copies of all outdated SOPs are destroyed (or marked as obsolete), and the scanned copy of the SOP is removed from the Library drive.

4.1.5 LIMS

TriMatrix utilizes the Element LIMS system developed by Promium Corporation. This system controls all aspects of laboratory operations. The main functions of the LIMS system are:

- Project Management
- Sample Management
- Work Scheduling and Management
- Data Entry, Verification, and Approval
- Report Generation

- Invoicing

4.2 SAMPLE CONTROL, FLOW, AND STORAGE

Presented in the following section is a description of the policies and procedures that were developed to identify, monitor, and document the flow of samples through the Laboratory. A flow chart depicting this process is presented in Figure 4-4.

4.2.1 Project Initiation

When samples are received at TriMatrix, the necessary information that will direct the analytical scheme has already been developed and implemented within the project initiation/project management process. This process starts with the award of a contract or proposal, a client request, or a pre-scheduled sampling event. The basic steps and supporting documentation involved in the project initiation process begins with the gathering of project information, communications with all affected laboratory areas, and the input of required project related data into the LIMS system. All requests for analytical work are reviewed by the project chemist, and when necessary, applicable management staff to verify the laboratory has the capability to perform the requested tests and meet the requested turnaround times. Requests for changes to in-progress projects must be made with the appropriate project chemist. Changes in methodology will typically require client approval. The project chemist will be responsible for coordinating all requests for changes with the impacted laboratory areas. All approved changes will be formally made via the laboratory's LIMS system, thus continuing the normal paperwork flow.

TriMatrix uses test methods that meet the needs of the client and are appropriate for the tests undertaken. Methods published in international, regional, or national standards are used. TriMatrix uses the latest valid edition of a method unless it is not appropriate or possible to do so. All analytical procedures are documented in SOPs supplemented with additional details to ensure consistent application.

When not specified by the client, TriMatrix will select appropriate methods published either in international, regional, or national standards, by reputable technical organizations, in relevant scientific journals, or as specified by the manufacturer of the equipment. Laboratory developed methods, or methods adopted by the laboratory, are also used when appropriate for the intended use and have been validated following the various initial demonstration of capability procedures.

When the client does specify methods, TriMatrix will inform them if they are considered to be inappropriate or out of date.

Routine samples are those samples and analyses that are continuously processed by TriMatrix. Projects that are non-routine are those that may require special testing, or which include parameters not routinely run within the laboratory, special holding times, or rush turnaround. Non-routine projects will require approval from all affected laboratory areas. This approval process is communicated in several different ways, including everything from the signing of a quality assurance project plan (QAPP) to the transmission and receipt of an electronic mail message.

Occasionally, a portion of a project may involve an analytical methodology not currently possible at TriMatrix. In this case, the client may elect to have the samples subcontracted to another laboratory. It is preferred that the client specify the subcontract laboratory. If for some reason this is not possible, TriMatrix will only pick subcontract laboratories that are either NELAP accredited or ISO-17025 certified for the specific method of interest. When samples will be subcontracted by TriMatrix, the client must complete and return the appropriate subcontract laboratory paperwork (Appendix AC), documenting their approval of the subcontract laboratory. A registry of subcontract laboratories used by TriMatrix will be maintained, documenting their NELAP accreditation or ISO-17025 certification.

The development of a project within the laboratory also involves the preparation and shipment of sample collection materials and containers. The

processes involved in the procurement, preparation, and shipment of sample collection materials and containers are presented in the sections below.

4.2.1.1 Sample Containers and Materials Procurement

TriMatrix utilizes only virgin bottle ware for all sample collection kits. Plastic ware is typically Nalge brand NDPE, while glassware is I-CHEM Series 200 (or equivalent) with the exception of the volatile containers. All volatile vials are purchased as Series 300 from either I-CHEM or QEC.

Series 300 (or equivalent) bottle ware is available for other sample analyses upon request, generally at an additional cost.

4.2.1.2 Preparation of Containers

All sample containers utilized for the collection and preservation of environmental samples are prepared by the bottle prep group. The staff members of this group focus their activities exclusively in the area of sample container procurement, preparation, and shipping.

TriMatrix has developed a unique color coded bottle tagging system for the purposes of defining and differentiating the various sample bottle types and the chemical additives that are required for proper sample preservation.

In conjunction with the color coded tagging system, a form has been developed to display the coding system, identify chemical preservatives, and provide a means of listing the exact quantity, bottle type, and preservatives required for each sample location. An example of the TriMatrix Sample Inventory and Master Bottle Packing List form was provided in Appendix N. An example of the TriMatrix sample bottle tagging system was presented in

Figure 4-3. This illustration shows both sides (front and back) of a bottle tag as it appears on a prepared sample container, upon completion of the log-in process.

4.2.1.3 Sample Container Shipment

When all containers have been assembled as requested on the Master Bottle Packing List, the bottles are packaged and placed into one or more shipping coolers. 40 mL glass vials are packed in small bubble pack bags. An attempt is made to organize each sample cooler to help minimize time spent in the field. When possible this is accomplished by packing bottles together by sample point. When complete, each shipping container will be inspected by a project chemist to verify its accuracy. Documentation of this inspection is made on the bottle packing list. A copy of the bottle packing list is placed in each cooler.

Also provided in each cooler is a set of instructions or comments about the containers, material safety data sheets for all chemical preservatives present, a return address label, an external COC form, and if required, TriMatrix sample bottle custody seals. All materials are packaged in a waterproof zip-lock bag. Examples of these additional materials are presented in Appendix AD.

Packing is now added to the cooler and the shipping container is sealed with banding straps to validate the integrity of the containers during shipment to the sample site. When requested, signed TriMatrix custody seals can also be applied to the outgoing cooler.

4.2.1.4 Sample Receipt

The receipt of all sample shipping coolers (empty or full) will be documented in the Sample Receipt Record logbook (Appendix O).

This logbook documents the delivery method, date, and time, the number of coolers received, the client, and the name of the TriMatrix employee who received the cooler. This information is entered into the logbook immediately after drop-off.

As soon as possible after the shipping cooler is received and all available information entered into the Sample Receipt Record, cooler inspection and sample temperature determination occurs. The observations associated with this step by step process are recorded on the "Sample Receiving/Log-in Checklist" (Appendix P). This Checklist must be completed for all samples for a given project received on a given day. A supplemental "Sample Receiving/Log-in Checklist Additional Cooler Information" form is available when receiving projects consisting of more than four coolers (Appendix Q).

IMPORTANT: When initiating each Checklist, make sure the Receipt Log Page/Line number from the Sample Receipt Record logbook is recorded at the top of each Checklist. This ties the receipt of the sample coolers in with the samples themselves.

Record the cooler number of the first cooler and the current time. Observe and record the type of coolant used. When possible, the sample temperature of three random samples (locations representative of the coolant present in the cooler) will be taken. If a temperature blank was received, measure and record this temperature as well.

Sample temperatures are recorded using a calibrated infrared thermometer. Because this type of thermometer is actually measuring the temperature of the container, it is critical that the temperature is taken as the sample is removed from the cooler. The container warms up quickly and any other method will result

in an incorrect reading. Do not dry the container prior to measuring the temperature. Containers wet from melt water are preferred to dry containers. Record the temperature values on the Checklist. Report all temperatures to the nearest 0.1° C. If a correction factor is necessary, record the correction factor and the corrected temperature on the Checklist. If any temperature exceeds 4° C, average the three sample results and also report the average. If the average temperature of the three samples, or the temperature of the temperature blank exceeds the 6° C required by most regulatory bodies, it must be noted on the Checklist.

If the receipt of the samples and temperature determination have been performed outside of normal business hours, replace the temperature blank and any samples removed back in the original cooler, and transfer the cooler in the walk-in. Assemble all the paperwork, and place it in the after-hours basket. The remainder of the receiving process will be performed by a log-in technician during the next business day.

4.2.1.5 Sample Examination

Samples received at TriMatrix are required to be accompanied by a TriMatrix Laboratory Chain-of-Custody (COC) form (Appendix AE). For samples received without this form, the log-in technician will initiate the COC process. Should a submittal or delivery group be identified as an internal COC project, the log-in technician will initiate the procedures outlined in section 4.2.2 B.

The remainder of page 1 of the Checklist is now filled in. Observations are made on the accuracy of the COC and the condition of the sample containers. Many of the aqueous samples received have been subjected to some form of chemical preservation. Verification of the preservation is required; however, depending on the analysis this verification may not occur

during the log-in process. The "Sample Preservation Verification Form" (Appendix R) specifies what container types will have their preservation verified during log-in. The form also specifies what container types can have an incorrect preservation adjusted. Preservation verification is performed via a pH check using calibrated pH strips. Determine the correct reading against the color chart on the pH strip container. Document the pH found on the Sample Preservation Verification Form. Use only the pH strips located in the log-in area whose calibration has been verified and recorded in the pH Strip Calibration Logbook (Appendix AF).

Should a) the result of any preservation check indicate that the sample has not been properly preserved in the field (or the buffering capacity of the sample has resulted in an unacceptable sample pH at receipt) or b) there is insufficient evidence indicating that other needed preservation reagents (e.g., Zinc Acetate for Sulfides) have been added, then a Sample Receiving Non-Conformance Report (Appendix S) is to be initiated and the project chemist contacted as soon as possible. In some instances, the holding time of such samples may be shortened. No preservation adjustment may be made without approval from a project chemist.

IMPORTANT: Shaded boxes on the Checklist indicate an out-of-control situation. The selection of any shaded box during the completion of this form also requires the initiation of the Sample Receiving Non-Conformance Report.

Collect all paperwork and deliver to the appropriate project chemist for review. Any issues that require contact with the client for resolution will be made in a timely manner. The project chemist will create a submittal and return the paperwork. Once

the project chemist returns the paperwork, page 2 of the Checklist can be completed, and the samples logged into the LIMS system.

4.2.1.6 Sample Log-In

All samples received by TriMatrix are logged into the LIMS system. The log-in procedure assigns a unique TriMatrix sample number to each sample, allowing samples to be tracked, data stored, and quality control associated for any sequence of events during a particular analytical period. The primary steps involved in the sample log-in process are presented below.

4.2.1.7 Sample Splitting

In the event that TriMatrix is unable to provide sample bottles, or circumstances prevent the splitting of samples in the field, the log-in technician can provide sample splitting services; however, sample splitting will typically be performed by a laboratory area chemist. These services include taking the sample as received and sub-sampling it into the appropriate bottle with the preservative requirements as set forward in Appendix AG – Sample Collection Guidelines Bottle and Preservative Requirements. Sample splitting will only be performed when instructed by a laboratory project chemist with client approval.

A. Sample Splitting-Water Samples

Laboratory area managers will be consulted in order to insure that sufficient volume will be available to all areas of the lab after splitting. In the event that sufficient volume does not exist, the Project Chemist will be immediately notified for resolution.

When a bulk sample arrives for both organic and inorganic analysis, and sufficient sample exists, the organic aliquots will be

removed first. The remainder of the sample will be transferred to properly preserved containers for each inorganic analyses.

B. Sample Splitting-Solid Samples

When solid samples, such as sediment or soil, are to be received at TriMatrix, every attempt will be made by the Project Chemist and field sampling personnel to insure that two samples are provided as replicates for the appropriate tests. One of these samples will be assigned to the organic area and the other to the inorganic area. If only one sample is received and if organic analyses are required, the organic aliquots will be removed first. Prior to sub-sampling, solid samples will be made homogeneous by either one or all of the following manners:

- Stirring
- Grinding
- Particle separation (sieving)

The laboratory area manager is responsible for deciding how a solid sample will be split. Problems or concerns that may arise on splitting a solid sample will be addressed by the Project Chemist and Laboratory Area Manager. After the organic portions have been removed or split, the remaining sample will be provided to the inorganic facilities for any further splitting.

4.2.1.8 Sample Distribution

All samples received at TriMatrix are labeled by the log-in technician. These labels include both the necessary information for proper identification, and information on any potential for flammability, reactivity, contact, or health based risks.

In addition to the sample identification label, all TriMatrix bottle and preservative types are clearly identified by means of a color coded tagging system (section 4.2.1.2). This allows everyone involved in the analytical process, from sample collection, sample analysis, and sample disposal, to clearly identify all containers for their intended use. This color coded process helps insure the right container type and preservative is utilized for the requested analytical procedure.

After completing the log-in process of all the various samples connected with a particular project, the log-in technician will store the samples in the correct Controlled Temperature Unit (CTU).

- Routine Water and Solid Samples: Samples that need to be refrigerated will be stored in the CTU designated for all routine water and soil samples.

- Routine Volatile Water and Solid Samples: These samples are placed in the designated VOA CTUs. Volatile water and soil samples are segregated and stored separately. No other samples or standards may be stored in the VOA sample CTUs.

  All CTUs used for VOA sample storage will also contain a storage blank. The storage blank is a preserved 40 mL VOA vial filled with deionized/distilled water. The storage blank is replaced and analyzed on a weekly basis. If positive results are observed for any target analyte above the laboratory's minimum reporting limit, all samples stored concurrently in the CTU must be evaluated for possible contamination. All sample results within 5 times the level quantitated in the storage blank must be qualified as estimated.

- Odoriferous and Hazardous Samples: These samples are stored separately in a special vented facility. If volatile analyses are to

be performed, they are stored under refrigeration. They will be identified to the laboratory by means of a sample or submittal narrative within the LIMS System.

All samples that are involved as physical evidence in a legal procedure or simply identified as Chain-of-Custody will be handled under COC procedural safeguards.

4.2.2 Chain-of-Custody (COC)

All samples received by the laboratory will require some form of chain-of-custody (COC). TriMatrix practices two levels of COC, external and internal. The degree of custody tracking and documentation is driven by the final deposition of the laboratory data. Generally, if samples and their analytical results are subject to involvement as physical evidence or in a legal procedure, both external and internal custody procedures will be followed. If samples or results are not subject to legal procedures, only external COC procedures will be followed. A description of these two custody scenarios is presented as follows:

A. External COC

Samples only requiring external COC will have their custody tracked from sample collection to delivery at the laboratory. This process involves the completion of a TriMatrix external COC form, as presented in Appendix AE. This form accompanies the sample containers prepared by TriMatrix to the sample collection site. Any sample or submittal received at the laboratory without a TriMatrix external COC form will initiate a process where the log-in technician will complete the necessary external COC forms for carrier sign-off.

For document control purposes, all external COC forms have a unique identification number.

B. Internal COC

Samples requiring strict COC will initiate the process by which all events or periods of sample handling will require a traceable document protocol.

The internal COC process involves the completion of a TriMatrix internal COC form for all phases of the analytical process. This includes sample extractions, distillations, digestions, analyses, and disposal. An example of the TriMatrix internal COC form is presented in Appendix AH. All internal COC forms are maintained in a series of submittal or delivery group folders.

C. Sample Security

All samples, whether under external or internal COC protocols, are maintained in a limited access secured area. This level of security is applied to all phases of the analytical process from sample log-in to final sample disposal.

D. Sample Disposal

All samples received are subject to disposal as waste once tested and discarded. Three general categories discarded samples fall into are the following:

1. A sample may be returned to the client (specifically, if highly contaminated).

2. A sample may be discarded as too contaminated for municipal disposal and must be disposed of as waste through a hazardous waste facility.

3. Inert, uncontaminated, and nontoxic samples in accordance with municipal waste regulations may be disposed of in the municipal dumpster and/or the laboratory waste room sink leading to the city sewer.

4.2.3 General Laboratory Security

Access to the laboratory is handled in a secure fashion, with access restricted to authorized personnel only. All laboratory areas including sample storage, sample container preparation, analytical laboratories, sample preparation, sample disposal, analytical documents, and data files are restricted. Non-authorized personnel may enter these areas only when escorted by a laboratory staff member.

It is the responsibility of all laboratory staff members to insure that the rules of restricted access are followed and maintained at all times.

4.3 CALIBRATION AND CALIBRATION VERIFICATION

This section describes procedures for maintaining the accuracy of all the instruments and measuring equipment used in conducting laboratory analyses. Calibration of the instruments and equipment is performed prior to each use or on a scheduled periodic basis.

Calibration of laboratory instruments and equipment is performed to verify that the analysis portion of the testing process is functioning properly and at the required sensitivity. A calibration section included in each analytical SOP covers the frequency, stability, and specific calibration steps, based on analytical method requirements and instrument or equipment manufacturer's recommendations.

Initial calibration is performed using standards of certified value to establish the linear range of the analysis for the analytes of interest. Each calibration curve is verified using a Laboratory Control Standard (LCS) prepared from a source dissimilar to that used in the preparation of the calibration standards. The calibration is also verified at the beginning and during the analytical sequence, using a standard prepared from the same source as that used in the initial calibration.

Calibration activities are divided into three categories:

Field Equipment (section 4.3.1)
Laboratory Instrumentation (section 4.3.2)

Laboratory Equipment (section 4.3.3)

4.3.1 Field Equipment

Perform daily calibration checks on field equipment prior to the commencement of any field analyses. Follow the written calibration procedure for each individual piece of field equipment. The equipment is held out of service until repairs and successful recalibration occurs. A summary table of all calibration procedures and frequencies is included (Table 3).

4.3.2 Laboratory Instrumentation

Calibration of laboratory instruments is based on approved SOPs. Records of calibration, repairs, or replacement are filed and maintained by the designated laboratory analyst. These records are filed at the location where the work is performed and are subject to QA audit. For all instruments, the laboratory maintains in-house spare parts or service contracts with vendors. A summary table of all calibration procedures and frequencies is included (Table 4). Flag any instrument that does not pass daily requirements. Hold the instrument out of service until repair or successful recalibration occurs.

4.3.2.1 Inorganic/Classical Chemistries

Inorganics analysis utilizes a wide variety of wet-chemical procedures and instruments. Calibration steps may vary depending on the specific analytical method being utilized. However, certain general principles of calibration apply to all inorganics testing. Every method must be calibrated before an analysis is performed. Using a group of certified standards, the linear range is defined. The calibration is checked on a continuing basis to be certain that the method is within the required test parameters. All inorganic calibrations must meet the specific requirements described below unless the method or equipment specifies modifications.

The instrumentation used to conduct these analyses is calibrated using calibration standards prepared by dilution of stock solutions. One standard is prepared at the reporting limit of the analyte of interest while the other standards bracket the concentration range of the samples. The high or the low standard may be omitted from the calibration curve; however, the minimum number of calibration standards required by the method must be maintained. Additionally, the minimum reporting limit must be elevated, or the linear range reduced, depending on which standard was dropped.

A laboratory control standard originating from a dissimilar stock solution than that used for preparation of the calibration standards is prepared and analyzed. An initial calibration blank and initial calibration verification standard (same source as initial calibration standards) are analyzed at the beginning of each run. A continuing calibration standard (same source as initial calibration standard) and continuing calibration blank will be analyzed after each batch of 10 samples. The value of the continuing calibration standard concentration must agree within the method specified criteria; generally ±15 percent of the initial value, or the appropriate corrective action is taken. Corrective action may include recalibrating the instrument and must include reanalyzing the previous 10 samples.

4.3.2.2 AAS/ICP/MS Emission Systems

The atomic absorption spectrophotometer (AAS), inductively coupled plasma emission spectrophotometer (ICP), and inductively coupled plasma mass spectrometer (ICP/MS) instruments are calibrated by the use of a minimum of three calibration standards (6 for ICP/MS) prepared by dilution of certified stock solutions. One standard is prepared at the reporting limit of the analyte of interest while the other standards bracket the

concentration range of the samples. The high or the low standard may be omitted from the calibration curve; however, the minimum number of calibration standards required by the method must be maintained. Additionally, the minimum reporting limit must be elevated, or the linear range reduced, depending on which standard was dropped. Calibration standards contain acids at the same concentration as the digestates. A continuing calibration standard is analyzed after every 10 samples. The value of the continuing calibration standard concentration must agree within method specified criteria, generally ±10 percent of the initial value or the appropriate corrective action is taken. Corrective action may include recalibrating the instrument and must include reanalyzing the previous ten samples.

4.3.2.3 Gas/Liquid Chromatography

Analysis done by gas chromatography follows USEPA protocols. The instrument is calibrated using three or five point calibration curves (depending on method requirements) for both volatile and semi-volatile compounds. The high or the low standard may be omitted from the calibration curve; however, the minimum number of calibration standards required by the method must be maintained. Additionally, the minimum reporting limit must be elevated, or the linear range reduced, depending on which standard was dropped. Continuing calibrations are performed after every ten samples. The value of the continuing calibration standard must agree within ±15 or 20 percent (depending on method requirements) of the initial value or the appropriate corrective action is taken, which may include recalibrating the instrument and must include reanalyzing the previous ten samples.

4.3.2.4 Gas Chromatography/Mass Spectrometry (GC/MS)

Prior to calibration, the instruments used for GC/MS analyses are tuned by analysis of p-bromofluorobenzene (BFB) for volatile analyses and decafluorotriphenylphosphine (DFTPP) for semi-volatile analyses. Once the tuning criteria for these reference compounds are met, the instrument is initially calibrated using a three or five point calibration curve (depending on method requirements). The high or the low standard may be omitted from the calibration curve; however, the minimum number of calibration standards required by the method must still be maintained. Additionally, the minimum reporting limit must be elevated, or the linear range reduced, depending on which standard was dropped. The instrument tune will be verified each 12 or 24 hours of operation (depending on method requirements). Continuing calibration is verified as specified in the method. The calibration standards are commercially available certified standards containing the target analytes, surrogate spikes, and internal standards.

4.3.3 Laboratory Equipment

Personnel performing calibration should also be alert for any condition that renders a piece of equipment inoperable or unfit for use; for example, inspect thermometers to ensure that mercury or alcohol columns are not separated. If an equipment malfunction is noted during calibration, the equipment must be tagged and removed from service. The equipment is held out of service until repairs and successful recalibration occur. Record all malfunctions, repairs, and re-calibrations in the appropriate instrument maintenance and run logs.

Maintain records for each piece of equipment requiring calibration, showing equipment description and identification number, calibration frequency and acceptable tolerances, personnel performance calibration, date, reference material used, calibration results including acceptance or failure, removal from service, repairs, and date and authorization for return to service.

4.3.3.1 Balances

An annual third party maintenance and calibration is performed on all balances. Daily calibration is performed by TriMatrix on all balances using class S or higher NIST traceable weights. Provided daily calibration is successful the weights themselves are indirectly calibrated on a daily basis via the third party's calibration; therefore, re-certification or replacement of the weights is not required every five years.

4.3.3.2 Thermometers

Thermometer calibration is done annually, using a NIST certified thermometer. The NIST thermometer must be re-certified or purchased new every five years. Written records are maintained of all annual calibrations.

4.4 DATA REDUCTION, VALIDATION, AND REPORTING

Data reduction is the process by which raw analytical data is tabulated and calculated. Data validation is the review of the data generation and reduction process. Data reporting is the compilation of all sample results for distribution to the client. All analytical data generated by TriMatrix Laboratories is subjected to the reduction, validation, and reporting process as described below.

4.4.1 Laboratory Data

4.4.1.1 Data Reduction

Initial results for most analyses are calculated using a computer directly interfaced to the instument. Data reduction is accomplished using software that has been validated for its intended purpose. The initial result is exported to the LIMS system. Data such as initial volume, final volume, and percent

solids, are used by the LIMS system to calculate a final result. When manual data reduction is required, it is performed according to the written standard operating procedure for that analysis.

4.4.1.2 Manual Integrations

Manual integration is defined as any post acquisition adjustment to the automated software peak integration. Manual integrations are often times legitimately required to correct for baseline drift, noisy baselines, poorly resolved peaks, closely eluting or missed peaks, peak tailing, or peak splitting. Manual integration may never be used for the sole purpose of correcting for failing quality control parameters (i.e. shaving or enhancing peak areas or heights to make failed calibrations, surrogates, or internal standards pass), or as a substitute for poor or ineffective sample cleanup. Manual integration must be used cautiously due to the increased scrutiny inherent with adjusted data. Particular attention will be paid to manual integrations performed on standards and blanks since these samples are typically free of interferences.

Before and after documentation must be provided with all manual integrations. This documentation must clearly show the original integration "before", and the manual integration "after" baseline. Clear identification of manual integrations must be included in the case narrative for all samples analyzed under Federal Facilities work requirements. All quantitation reports must clearly identify manual integrations by flagging the peak with a designator that cannot be removed by the analyst. Additional documentation requirements include:

- Date of the manual integration
- Reason for the manual integration
- The integration area or height before manual integration
- The integration area or height after manual integration

- A signature/date by both the analyst and the reviewer.

Any questions concerning manual integration must be resolved with the area manager or the quality assurance officer before final results are approved and released to the Project Chemist. The complete laboratory manual integration requirements are detailed in the TriMatrix manual integration SOP GR-10-115.

4.4.1.3 Four Levels of Data Validation

First Level Review

Data validation begins with the analyst, because it is the basic responsibility of the analyst to produce data that is complete, correct, and conforms to all applicable methods and standard operating procedures. If results are not acceptable, it is the duty of the analyst to perform the appropriate corrective action and to thoroughly document that action. The analyst will verify the following before updating the analysis status to "Analyzed":

- Applicable standard operating procedures were followed
- Proper analytical sequence was followed
- Sample preparation information was correct
- Calibration has been performed properly
- Analytical results are complete
- Holding times have been met
- Method criteria were met
- Any special sample preparation or analytical requirements have been achieved
- All analytical abnormalities have been noted
- Corrective actions are thoroughly described
- Good record keeping practices have been followed
- Any problems are communicated to area manager
- Data was correctly transferred to Element

- Calculations were performed properly
- Quality control samples are within established limits
- Documentation is complete
- Raw data, including chromatograms and instrument printouts are complete
- Case narrative or qualifier pages are complete

Second Level Review

The laboratory area peer or designated validator basically performs the same validation steps performed by the analyst. Particular attention should be paid to:

- Dilution factors were entered correctly and detection limits elevated accordingly
- Analysis dates are correct
- Quality control and analytical batch information is correct
- Quality control results and spike amounts are correct and in control
- Project specific limits are correct
- Run a draft copy of the report, specific to the laboratory area, to verify all results have been adjusted correctly
- Any required qualifiers or narratives have been entered

Any problems must be resolved with the analyst, and when appropriate the quality assurance manager, prior to updating the status to "Reviewed."

Third Level Review

Once all analyses associated with a work order have been entered into the LIMS system and approved, the project chemist will perform the Third Level Review. This review will verify that:

- The requirements of the client have been met
- All required narratives and qualifiers have been included
- All quality control parameters required are in the report
- Results of complimentary tests make sense
- The data is accurately presented
- Holding times have been met
- Calibration checks are sufficient
- Documentation is complete

Once this review is complete the project chemist will approve the data and generate a final report. It is during this time that any data package deliverables are collected and reviewed. When printed the work order status updates to "Reported."

Fourth Level Review

The project chemist will perform a final review of the data package hard copy to ensure that:

- All required data package components are complete and accounted for
- Quantitative results are correct
- The overall presentation of data to the client is in an understandable format

In addition to the formal data validation guidelines listed above for the analyst, area manager, and project chemist, there are many practical questions that all of these persons need to keep in mind when reviewing data and finished client reports. Among these "common-sense" evaluations of laboratory data are the following important considerations:

- Data makes good, sound, practical sense

- Multiple runs of the same samples relate, match, or are within acceptable range
- Data from complimentary analyses compares, i.e. COD>BOD>CBOD
- Total cyanide ≥ amenable and free cyanide
- Total solids ≥ suspended and dissolved solids
- TKN ≥ organic N + ammonia N
- Inorganic N = ammonia N + nitrate N + nitrite N
- TOC < BOD or COD
- Total phosphorus ≥ ortho phosphorus
- Calculated total dissolved solids/conductivity = 0.55 – 0.7
- Analytical run looks good; proper decisions were made
- Peaks from chromatogram or instrument printout look normal
- Computer identifications are correct
- Are qualitative/quantitative results real, especially low level
- Know and be sensitive to common laboratory contaminants
- Know area/analytical method pitfalls-be extra cautious
- All practices are sound and are supported by documentation-no appearance of random decisions

When complete the report will be signed. Data packages with deliverables will be scanned and archived. Work order status will be updated to "Completed".

4.4.2 Field Data

All data reduction, validation, and reporting for field activities must meet the same requirements as those required in the laboratory. Many of the field instruments, such as those measuring pH, dissolved oxygen, turbidity, temperature, and specific conductance, require a manual data printout from a computer interface. The analyst is responsible for immediate tabulation and calculation of raw data in the field. The field section manager must perform a prompt, on-site validation of field data before the opportunity is lost to perform any necessary field re-tests.

4.4.3 Subcontracted Data

Analytical results from subcontracted samples will be reported as an attachment to the TriMatrix data package. The attachment will contain the entire subcontracted data package as received by TriMatrix. To eliminate the impression that the subcontracted analyses were performed by TriMatrix, subcontracted results will never be incorporated into the TriMatrix generated report.

4.5 VERIFICATION PRACTICES - EXTERNAL/INTERNAL QUALITY CONTROL

4.5.1 Standard Reference Materials

A crucial step in the generation of quality data is the purity and traceability of reference materials used in the analyses. Reference materials may be physical standards (such as certified thermometers and weights used to calibrate laboratory thermometers and balances) or chemical standards (used to establish and check operational calibration of analytical methods). Physical standards should be traceable to the National Institute of Standards and Technology (NIST). Physical standards must be recalibrated or purchased new every five years by an external vendor who is certified to perform the calibration. Chemical reference materials of high quality can usually be obtained from reliable commercial vendors. For a given analysis, standard reference materials must be kept on hand from more than one vendor source. During the testing operation, standard reference materials from different vendor sources are crosschecked with each other.

4.5.2 Internal Quality Control Programs

TriMatrix routinely adds samples to the sample stream to demonstrate that the total testing process is operating within prescribed limits for accuracy and precision. With the exception of Blanks, the concentration of these quality control samples is known prior to the analysis. Types of Quality Control

Samples are presented in Table 5. Duplicates and spiked duplicates are selected at random, and when not specified are rotated among clients.

4.5.3 External Quality Control Samples-Proficiency Testing

TriMatrix Laboratories receive Performance Testing (PT) samples on a scheduled basis from state and federal regulatory agencies as well as certain client organizations. A summary of these PE samples is given below:

PT Program	Sample Type	Source	Frequency
WS	Drinking Water	ERA	Semi-Annual
WP	Waste/Ground Water	APG	Semi-Annual
Soil	Soil	ERA	Semi-Annual
Varies	Environmental	State/Federal Programs	Varies
Varies	Environmental	Client	Varies

TriMatrix receives written reports from sponsoring agencies grading not only the laboratory performance, but also showing the comparison to other laboratories participating in the PT study. This provides feedback to laboratory personnel regarding the satisfactory use of analytical methods and equipment. Additionally, results from all single and double blind PT samples are used as part of the laboratories fraud prevention and detection program.

4.6 DATA ASSESSMENT PROCEDURES

4.6.1 Precision

Precision of laboratory analyses will be assessed by comparing the analytical results between matrix spike/matrix spike duplicate (MS/MSD) for organic analyses, and laboratory duplicate or MSDs for inorganic analyses. The relative percent difference (RPD) will be calculated for each pair of duplicate analyses using the following equation:

$$\%RPD = \left(\frac{S - D}{\frac{S + D}{2}} \right) \times 100$$

where:

S = first sample value (original of MS value)

D = second sample value (duplicate or MSD value)

4.6.2 Accuracy

Accuracy of laboratory results will be assessed for compliance with the established QC criteria using the analytical results of method blanks, reagent/preparation blank, matrix spike/matrix spike duplicate samples, equipment blank, and trip blanks. The percent recovery (%R) of matrix spikes will be calculated using the equation below:

$$\%R = \left(\frac{A - B}{C} \right) \times 100$$

where:

A = the analyte concentration determined experimentally from the spiked sample;

B = the background level determined by a separate analysis of the un-spiked sample

C = the amount of the spike added

4.6.3 Control Limits

Unless fixed in the analytical method, all quality control acceptance limits in use at TriMatrix are derived from historical data. The laboratory LIMS system retains quality control data from the past 2 years (up to 2000 data points) for each method, matrix, and QC type combination. Precision and accuracy control limits are calculated at a 99% confidence level (+/- three standard

deviations); warning limits are calculated at a 95% confidence level, (+/- two standard deviations). Accuracy windows are calculated using the mean of the percent recoveries. Precision windows are calculated as specified in SW-846, using the relative percent difference of the amounts found, not the percent recoveries.

4.6.4 Uncertainty

In addition to the precision and accuracy of a result, a value relating to confidence is available in the form of a measurement uncertainty estimate. The measurement uncertainty value is estimated using the QC-based nested approach and is calculated at the 95% confidence level. Uncertainty estimates are reported as "percent relative uncertainty."

4.6.5 Completeness

The data completeness of laboratory analyses results will be assessed for compliance with the amount of data required for decision making. The completeness is calculated as follows:

$$\text{Completeness} = \left(\frac{\text{valid data obtained}}{\text{total data planned}} \right) \times 100$$

4.7 PROCEDURES FOR CORRECTIVE ACTION

When a non-conforming event or process deviation has occurred which places the process out-of-control, corrective action is required. A written standard operating procedure (plan for corrective action) provides the steps for dealing with an out-of-control testing situation. The assessment of whether the process is out-of-control is based on predetermined limits for laboratory operations. Non-conformances based on statistical analysis or quality control samples are readily apparent and easy to identify. A process deviation, which does not have a directly observable impact on data quality, is more difficult to discern. Examples of the latter, subtler types of non-conformances include volatile samples not properly stored; oily layers in certain types of samples that

may interfere with analysis; or a water-soaked sample label whose information is barely legible. Discovery of a non-conforming event or process deviation can result from the observations of a staff member, a review of laboratory data at any level, the result of an audit, or a client complaint. A corrective action investigation will be initiated within one week of the discovery of any non-conformance. The time frame required to resolve a specific deficiency and implement the corrective action is dependant on the magnitude of the problem and the defensibility and use of the data. Most non-conformances should be resolved within 60 days from the initiation date. Non-conformances that specifically impact sample results should be resolved within 14 days.

The overall scheme of a corrective action plan can be outlined as follows:

1. Define the problem and evaluate the significance of the non-conformance;
2. Assign responsibility for evaluating the problem and determine if the client should be notified and/or work recalled;
3. Determine thorough investigation of all the pertinent facts what the probable cause of the problem is;
4. Select and implement the action(s) most likely to eliminate the problem and prevent recurrence;
5. Assign responsibility for carrying out the corrective steps and implement the action;
6. Follow-up to ensure that the problem has been eliminated and when necessary authorize the resumption of work.

Specific responsibility for implementing corrective action is as follows:

It is the responsibility of the analyst or other employee who observes a non-conforming event to:

- Identify and define the problem.
- Fill out a Non-Conformance Investigation Report (refer to Appendix AI).
  When applicable, investigate and attempt to determine the cause of the problem. Report the problem promptly to the area manager. When applicable, accept responsibility for implementing the corrective action approved by the area manager.
- When applicable, evaluate the effectiveness of the corrective action.
- When applicable, verify that the corrective action has eliminated the problem.

It is the responsibility of the laboratory area manager to:

- Review the problem and the proposed corrective action.
- If the reporting person does not have a remedy, work together with the person to determine a satisfactory solution.
- Assign the final corrective action steps to be performed.

It is the responsibility of the QA Department to:

- Follow-up to ensure that the problem has been eliminated and when necessary authorize the resumption of work.
- Review, sign, and categorize every Non-Conformance Investigation Report.
- Randomly review corrective action documentation in laboratory through internal audits to ensure that adequate records are being kept.

The ultimate goal of every non-conformance investigation is to resolve the error through identification of the error's root cause. Ideally, once the source of error is found, change can be implemented to prevent reoccurrence of the same error thereby providing a system of continuous quality improvement.

Non-conformances can originate from anyone in the laboratory. Provide the QA department with a copy of the initial report at the time of its distribution, followed by a copy of the completed report. The final report will be distributed to all necessary personnel. Initiation of non-conformance reports associated with out-of-control PT samples will commence with the QA department. The initial non-conformance will be typed up and may include attachments such as a graph charting the history of PT results for that analyte. The history of results for that analyte in PT studies will also be reviewed through the database, looking at additional items such as method, matrix, analyst, vendor, and study type (WP, WS, etc.).

Returned non-conformance reports will be typed and the final report may include copies of raw data, information concerning traceability, graphs charting historical data, graphs charting trends in analysis, calibration graphs or any other information relevant to the investigation.

When investigating a failing PT sample, a questionable analytical result, or a client complaint, the following systematic approach for error analysis should be followed until the primary source of error is located and resolved. Progress through them in the order they are presented below (easy to determine transcription error through difficult to determine analytical/procedural failure).

1. Consolidate all necessary raw information, run data and associated calibration and quality control data for both the reported and any non-reported analyses of that sample.
2. Confirm that the intended result was the reported result (transcription error).
3. Verify that the sample was prepped correctly.
4. Verify the correct analytical and pre-treatment method was used.
5. Double check all manual calculations, looking for incorrectly calculated results, missing dilution factor, wrong initial and final volumes, etc. Where possible manually calculate the result and compare with the reported result.
6. Compare the age of the calibration to the PT analysis date.
7. Review data associated with all quality control samples for biases. Also evaluate all QC solutions with respect to age, source, storage, and handling.
8. Determine the reasonableness of the data. Verify that all QC parameters were in control. Compare results to established limits to the data quality objectives of the study (i.e. tighter QC required for WS studies).
9. Review standard laboratory techniques used on the sample and all associated QC analyses. Were measurements used in quantitation made volumetrically? Were pipets and volumetric flasks used, or were less stringent techniques employed? Were serial dilutions made during the preparation of the curve?
10. Review analytical conditions, integration, background corrections, analyte resolution, and any confirmation runs.
11. Review calibration ranges. Are they too large for the analysis? An over extended calibration range will appear S-shaped. Check the population of curve points in the area of the analyte concentration.
12. Review calibration type (linear, average, response factor, polynomial non-linear, etc.). Reprocess multi-level curve data through a best fit program and if linear, perform a residuals analysis to identify outlier calibration points. If the result was quantitated using an average response factor, compare with the best-

fit information and confirm justification for use of the average response factor quantitation.

In general, there are three major areas where corrective action is required. These categories are described below. Non-Conformance Reports are required on indications flagged with a *. Other indications may require a Non-Conformance Report based on the circumstances.

4.7.1 Quality Control Failures

These are usually handled within the laboratory by the analyst.

Indications of Non-Conformance

Blanks, laboratory control, or spiked samples contain contamination greater than acceptable levels.

Suspicious trends in spike recoveries or relative percent differences (RPD) between duplicates.

Initial instrument blank, initial calibration standards, QC check standards, continuing calibration standard spikes, or method blanks are outside acceptance criteria.

The method blank or instrument blank analysis exceeds the detection limit for the analyte.

Recommended Corrective Action

Prepare another instrument blank. If the response is still greater than the reporting limit, look for sources of contamination in reagents, the laboratory working environment, and the instrument.

Reanalyze standard. If results are still unacceptable, prepare new standards. If necessary obtain new primary standards.

Reanalyze continuing calibration standard. If necessary, recalibrate and reanalyze samples since last successful continuing calibration.

Evaluate preparation of spikes, spiking techniques, spiking equipment and materials.

4.7.2 Procedural Failures

These are usually handled by the laboratory area manager and the quality assurance department.

Indications of Non-Conformance

*There are unusual changes in detection limits.

*Statistical quality control data is demonstrating unacceptable trends or is outside the warning or acceptance limits.

*Deficiencies are evidenced on performance evaluation samples or internal or external audits.

*Clients express concern about the quality of their data.

Recommended Corrective Action

Review the method with the analyst.

Reanalyze the samples and evaluate the results.

Recalibrate the instrument or analysis method with freshly prepared standards and reanalyze the samples.

Re-extract and reanalyze the samples per the method.

Evaluate the data and sample behavior and investigate any possible chemical interferences.

Re-run the samples using the method of standard additions.

Check the instrument for possible maintenance deficiencies.

Seek additional help from other analysts or provide additional training for personnel involved.

Perform a system audit to evaluate corrective action measures.

4.7.3 Test Specification Failures

These are usually handled by the analyst, laboratory area manager, and the quality assurance department.

Indications of Non-Conformance

Quality control check standard data is outside the acceptance limits defined for that analyte.

Recommended Corrective Action

Review the method with the analyst.
Reanalyze the check standard and evaluate the results.
Prepare fresh check standard or new primary standard.
Recalibrate the instrument or analysis method.
Switch to a different standard vendor.
Investigate possible chemical interferences.
Check the instrument for possible maintenance deficiencies.
Retrain the analyst.

4.7.4 Customer Complaints

The Quality Assurance Department coordinates with the client services staff to receive quality feedback from clients. It is the responsibility of the QA department to communicate any customer complaints to the laboratory operating areas and to follow-up on corrective action taken to prevent a recurrence.

4.8 PROCEDURES FOR PREVENTIVE ACTION

Changes and enhancements to existing policies and procedures are not always made based on the result of failing analytical performance or other non-conformances. Borderline performance, equipment changes/modernization, or outdated internal procedures are all areas that may require modification or enhancement. Employees are encouraged to analyze internal procedures of all kinds, and offer suggestions for improvement. A Preventive Action Investigation form exists for this purpose (Appendix AJ). The form is used to record a description of the existing procedure and a proposed solution, an action plan and systematic implementation schedule, and a follow-up section to monitor the effectiveness of any resulting changes.

All Preventive Action Investigations are loaded into a database similar to that used to track non-conformances

4.9 DEPARTURE FROM DOCUMENTED PROCEDURES

4.9.1 Management Policies

Any departure from a laboratory written standard operating procedure not directly involving sample analysis or processing must be approved by the area manager. The area manager must file a Non-Conformance Investigation Report. The Non-Conformance Investigation Report must be included as part of the data package.

Any departure from a SOP involving sample processing or sample analysis must be justified in writing by the analyst and laboratory area manager. The prior written approval of the laboratory president must be received before performing the analysis. The laboratory president must also file a Non-Conformance Investigation Report. This Non-Conformance Investigation Report must be included as part of the data package (the exception to this requirement is those items in the analytical methods where a written justification for technical and scientific reasons has been determined by the analyst and approved by the Laboratory President as a deviation from the analytical method).

4.9.2 Method Modification and Variances

Modification of, and variances in, analytical methods, except for the deviations justified in writing and approved per section 4.9.1, are strictly prohibited.

4.10 PERFORMANCE AND SYSTEM AUDITS

4.10.1 Internal Audits

Annually the laboratory will be audited by the quality assurance department to verify compliance to the ISO-17025 Standards. Additionally, quarterly internal audits will be conducted by the quality assurance department. Together these audits will encompass all elements of the quality system. A formal written follow-up will be conducted after every internal audit to verify that any deficiencies cited have been corrected, and that the corrective actions have been successful. The following areas will be included in the required internal audits.

4.10.1.1 System Audits

System audits are used to determine that each component within a laboratory system is functioning properly and adheres to the appropriate standard operating procedures, analytical methods, and requirements of the Quality Assurance Manual. Systems to be audited include:

A). Sample Handling and Control
B). Sample Analysis
C). Records Processing and Control
D). Support Systems (such as air handling, DI water, analytical balances, raw materials, etc.)

If during the course of an internal audit, problems were uncovered that may have impacted the laboratories ability to generate quality data, written notification must be provided to all impacted clients. Impacted clients include all those clients who received results from samples analyzed during the time frame the problem occurred. This is accomplished by a letter explaining the problem, and includes revised copies of the report that, if necessary, include any required data qualifiers.

4.10.1.2 Documentation Audits

The Quality Assurance department also performs audits of the laboratory documentation (laboratory notebooks, benchsheets, instrument run logs, client file folders, etc.) to assess the thoroughness and completeness of the documents.

4.10.1.3 Surveillance Audits

The Quality Assurance department, Area Manager, or their designate observes an analyst in detail as a test is being performed. Attention is given to general laboratory demeanor (orderliness, cleanliness, good laboratory practices in measuring, documentation, etc.) as well as to adherence to analytical methods and standard operating procedures.

4.10.1.4 Quality Assurance Reports to Management

The Quality Assurance Manager issues a written report to the Laboratory President after every audit. The report details any deficiencies identified as well as recommended corrective actions. The report also designates how follow-up on corrective actions by the Laboratory Area Manager and the Quality Assurance Manager will occur.

4.10.2 External Audits

4.10.2.1 On-Site Audits

Audits of the laboratory conducted by regulating agencies and client organizations are to be perceived by the laboratory staff as learning experiences and opportunities to hear suggestions from knowledgeable persons on how operations might be improved. Consequently, the laboratory staff is to be open and cooperative with external auditors. Formal follow-up using written summaries

of external audits is to be carried out to ensure that any suggested improvements are thoroughly evaluated.

4.10.2.2 Performance Testing Studies

TriMatrix participates in a variety of PT studies. Semi-annually TriMatrix analyzes single blind soil, ground water, and drinking water performance testing samples. TriMatrix also participates in various client (both single and double blind), State, and Federal PT sample programs.

Figure 4-1
Documentation System Structure

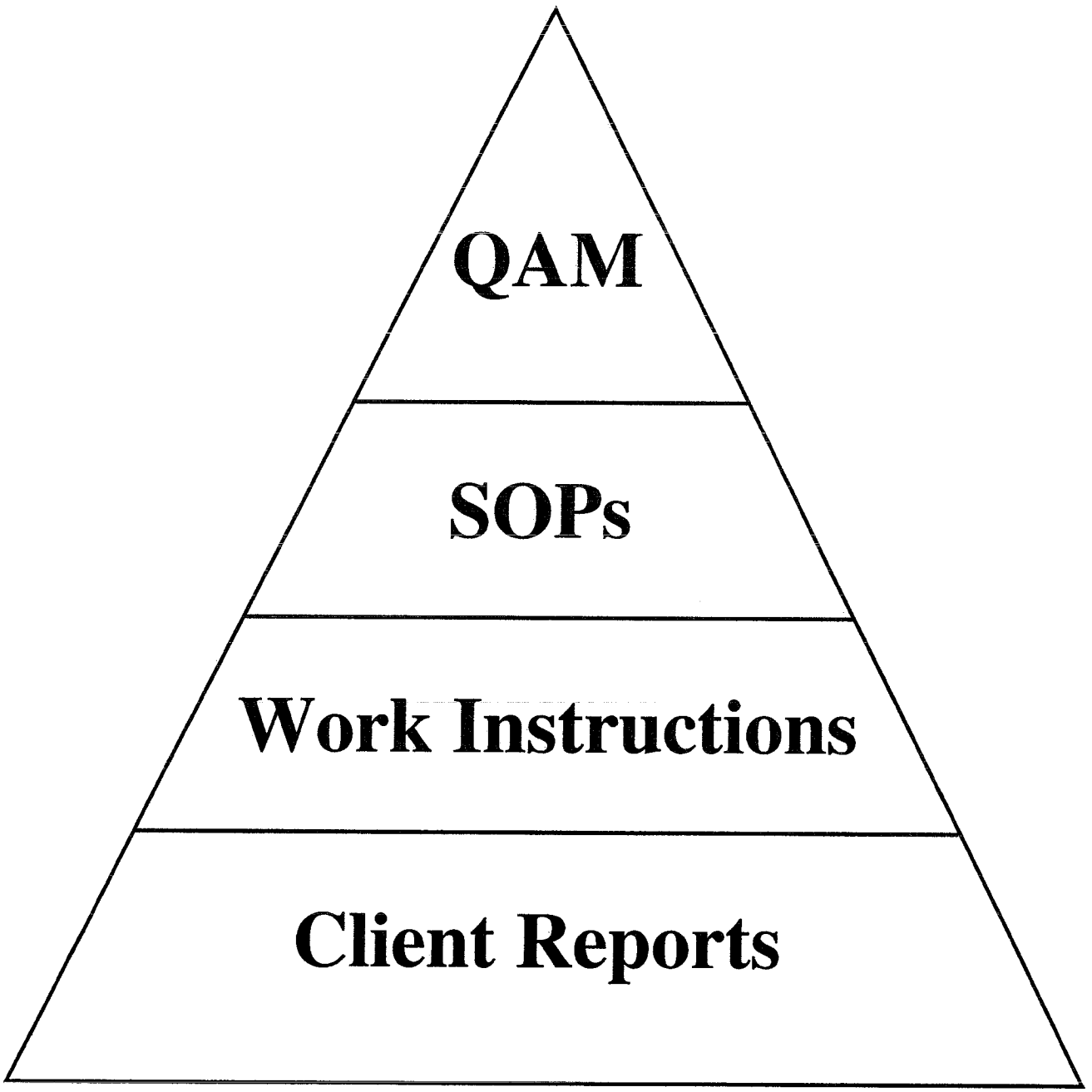


Figure 4-2

Document – Benchsheets/Client Report Flow Diagram

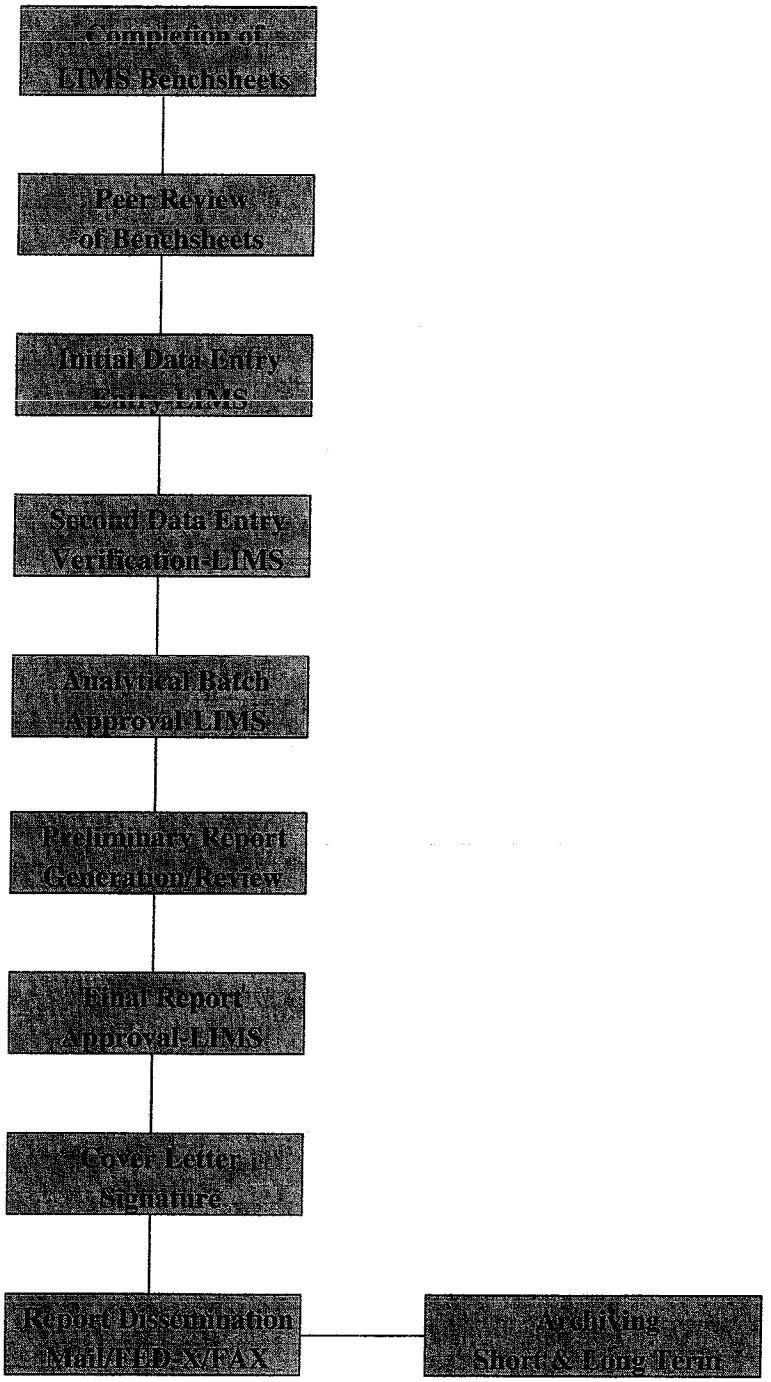
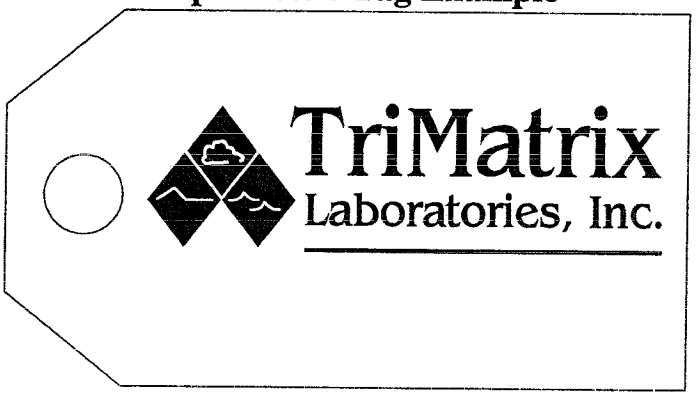
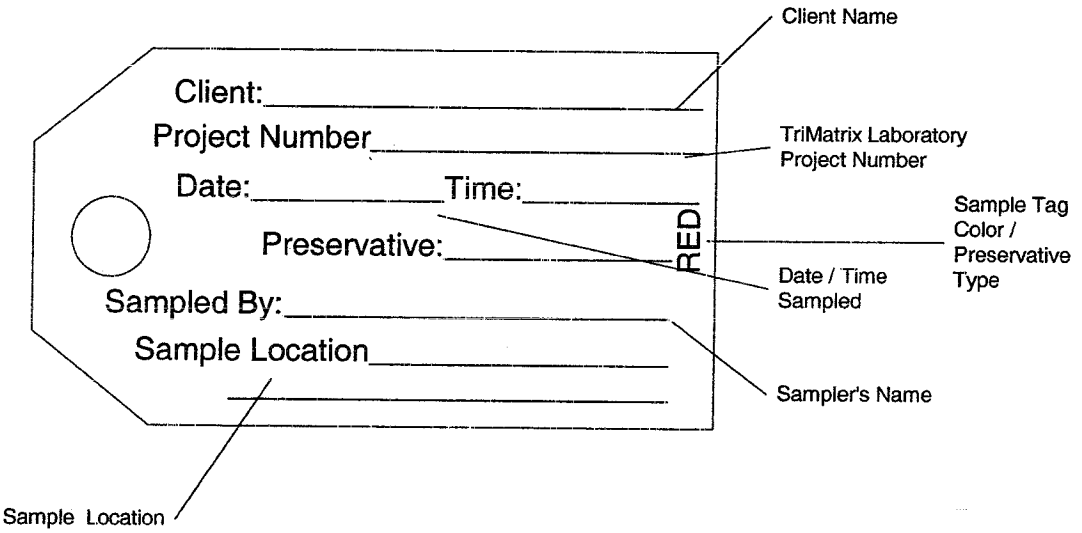


Figure 4-3
Sample Bottle Tag Example

Tag Face



Tag Back



Tag Face with LIMS Generated Log-In I.D. Label

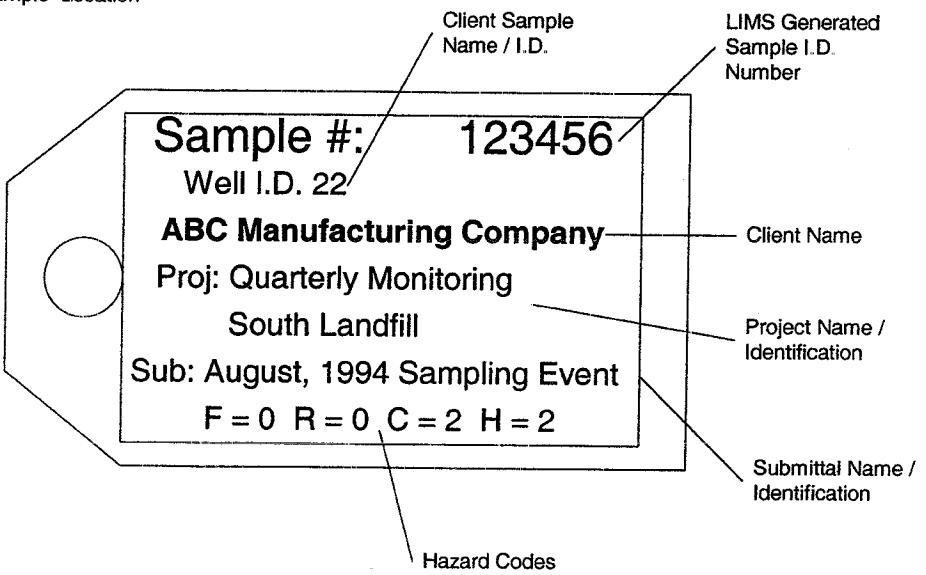
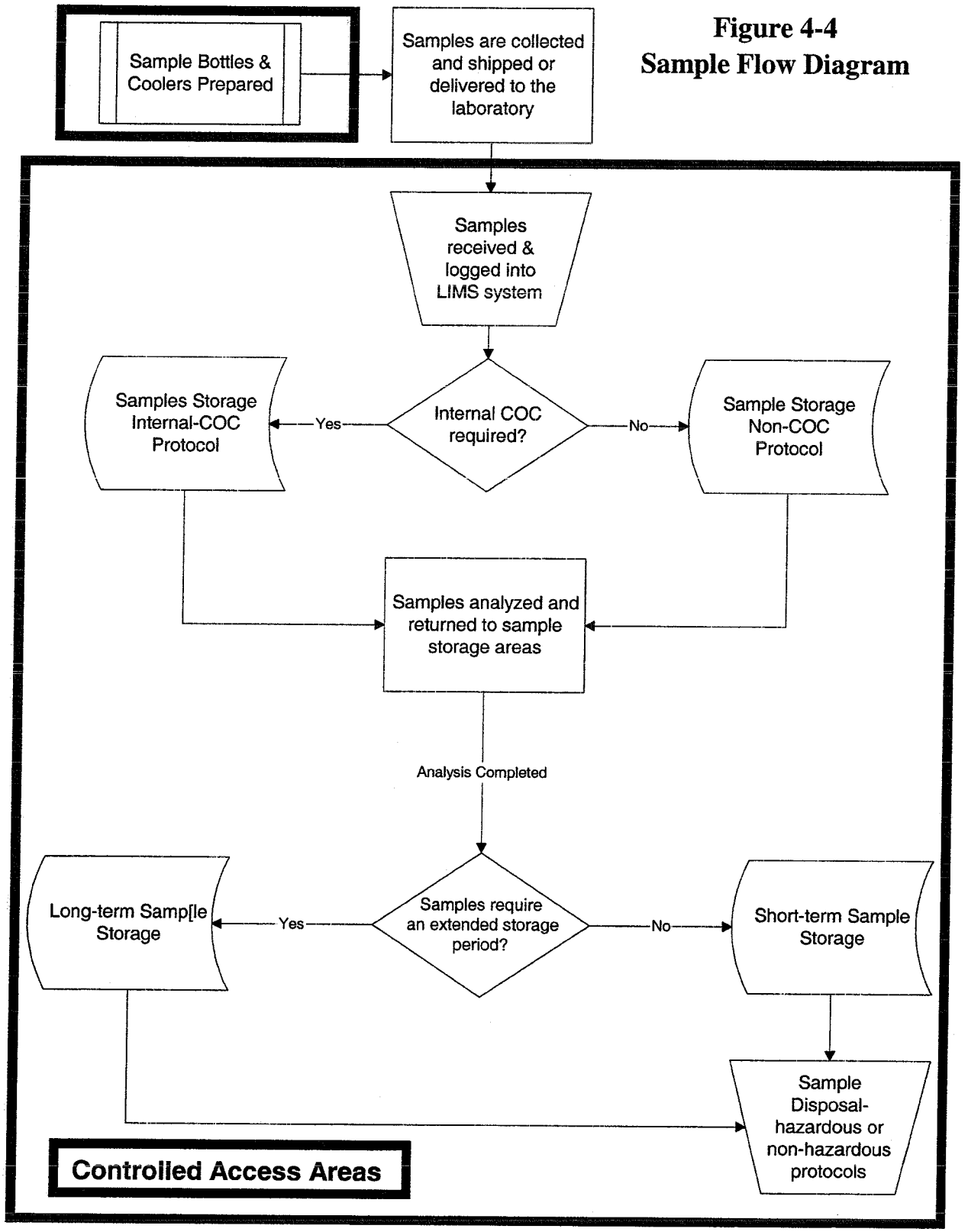


Figure 4-4
Sample Flow Diagram



5.0 REFERENCES

- Methods for Chemical Analysis of Water and Wastes; EPA-600/4-79-020 most current revision.
- Standard Methods for the Evaluation of Water and Wastewater; Current Edition, APHA, AWWA, WPCF.
- Handbook for Analytical Quality Assurance in Water and Wastewater Laboratories; EPA 600/4-79-019, most current revision.
- Physical and Chemical Methods for the Evaluation of Solid Waste; EPA-SW-846, most current revision.
- Guidelines Establishing Text Procedures for the Analysis of Pollutants; 40 CFR; Parts 100 to 149, Current Edition.
- Good Automated Laboratory Practices; USEPA Office of Administration and Resource Management, most current revision.

TABLE 1
Default Data Archiving Systems

Document Archives

Document Description	Storage Location	Storage Duration
Laboratory benchsheets	on-site	1 year
Laboratory benchsheets	off-site	6 years
Instrument Print-Outs (raw data)	on-site	1 year
Instrument Print-Outs (raw data)	off-site	6 years
Laboratory Logs (run, maintenance, analyst)	on-site	1 year
Laboratory Logs (run, maintenance, analyst)	off-site	6 years
Client Files (reports, correspondence, invoices)	on-site	1 year
Client Files (reports, correspondence, invoices)	off-site	6 years
Proposal Files	on-site	5 years
Purchase Agreements	on-site	5 years
SOPs	on-site	5 years

Electronic Archives

File Description	Storage Location	Storage Duration	Storage Media
Instrument Data Files-GC/MS	on-site	1 year	Compact Disk
Instrument Data Files-GC/MS (copy)	off-site	10 years	Compact Disk
Instrument Data files-GC (Turbochrom)	on-site	1 year	Compact Disk
Instrument Data files-GC (Turbochrom) (copy)	off-site	10 years	Compact Disk
Instrument Data files-AA, ICP, ICP/MS	on-site	1 year	Compact Disk
Instrument Data files-AA, ICP, ICP/MS (copy)	off-site	10 years	Compact Disk
Instrument Data files-Auto Analyzer	on-site	1 year	Compact Disk
Instrument Data files-Auto Analyzer (copy)	off-site	10 years	Compact Disk
LIMS daily backup	on-site fire-safe	30 day rotation	DAT-Tape
SOPs	on-site	indefinitely	Compact Disk

TABLE 2
Laboratory SOP Categories

Trace Metals
Gas Chromatograph
Spectrophotometric Procedures
Gravimetric Procedures
Extractions-Organic
Sales and Customer Service
Laboratory Computer Operations
Sample Receiving, Storage, & Disposal
Bottle Prep
Microbiology
Waste Characterization
Instrumental-General
Gas Chromatography/Mass Spectroscopy
Titrimetric Procedures
Electrochemical/Potentiometric Procedures
Quality Assurance
Business and Accounting
Laboratory Safety and Security
Miscellaneous
Inorganic-General

TABLE 3
Field Equipment Calibration

Equipment	Method Reference	Minimum # Standards Initial Calibration	Type of Curve	Frequency of Calibration	Acceptance/ Rejection Criteria Initial Calibration	Frequency of Continuing Calibration Verification	Acceptance/ Rejection Criteria Continuing Calibration Verification
Conductivity Meter	SW-846 Method 9050	2	---	Initial	± 5% of Value	Daily	---
Dissolved Oxygen Meter	Standard Method 4500-O G.	---	---	Initial	± 5% of Value	Daily	---
Temperature Probes	Standard Method 2550 B.	---	---	Initial	± 5% of Value	Daily	---
pH Meter	SW-846 Method 9040	3	Linearity	Initial	Adjust slope to within ±0.05 pH units accuracy	Daily	---

TABLE 4
Instrument Calibration

Instrument	Method Reference	Minimum Number Standards Initial Calibration	Acceptance/Rejection Criteria Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification	Acceptance/ Rejection Criteria Initial Calibration Verification	Frequency of Continuing Calibration Verification	Acceptance/ Rejection Criteria Continuing Calibration Verification
Mercury Cold Vapor AA	SW-846 7470/7471 EPA 245.1/245.5	5	Correlation coefficient must be ≥0.995	Daily, at the beginning of every analytical batch, and when CCV fails acceptance criteria	Every calibration	80-120% recovery	Every 10 samples	80-120% recovery
ICP	SW-846 6010 EPA 200.7	3	same as above	same as above	same as above	95-105% recovery	same as above	90-110% recovery
ICP/MS	SW-846 6020 EPA 200.8	6	same as above	same as above	same as above	90-110% recovery	same as above	90-110% recovery
Ion Chromatograph	SW-846 9056 EPA 300.1	6	Correlation coefficient must be ≥0.995	Every 6 months or when CCV fails	Every calibration	90-110% recovery	Every 10 samples	90-110% recovery
Konelab: Sulfate Chloride	EPA 600/4-79-020 Method 375.2 Method 325.2	10 8	same as above	Every batch	same as above	85-115% recovery	Every 10 samples	85-115% recovery
Phenolics (Total)	SW-846 9065 EPA 420.1	5-7	same as above	same as above	same as above	85-115% recovery	Every 10 samples	85-115% recovery
Cyanide Total and Amenable	SW-846 9012, 9014 EPA 335.1, 335.3, 335.4	7	same as above	same as above	same as above	90-110% recovery	Every 10 samples	90-110% recovery
TOC Analyzer-TOC	EPA 415.1	5	same as above	same as above	same as above	85-115% recovery	Every 10 samples	85-115% recovery

GC-PID/ ELCD	SW-846 8021 EPA 601/602	5 for linear 6 for quadratic 3	≤20% RSD use average RF or regression, >20% must use regression <10% RSD use average RF or regression, ≥10% must use regression	As needed, when CCV >15% expected response or concentration As needed when CCV fails method Table 2 criteria	As needed, with analysis of each curve	80-120% recovery	Before and after every 10 samples and at end of each analytical batch	±15% expected response or concentration; ±20% for compounds that boil below 30° C (Bromomethane, chloroethane, chloromethane, dichlorodifluoromethane, trichlorofluoromethane, and vinyl chloride Method Table 2 criteria
GC-FID	SW-846 8015	5 for linear 6 for quadratic	≤20% RSD use average CF or regression, >20% must use regression	As needed, when CCV >15% expected response or concentration	As needed, with analysis of each curve	80-120% recovery	Before and after every 10 samples and at end of each analytical batch	±15% expected response or concentration
GC-ECD	SW-846 8081 SW-846 8151 SW-846 8082 SW-846 8121 EPA 608 EPA 612	5 for linear 6 for quadratic 3	≤20% RSD use average CF or regression, >20% must use regression <10% RSD use average CF or regression, ≥10% must use regression	As needed, when CCV >15% expected response or concentration	As needed, with analysis of each curve	80-120% recovery	Before and after every 10 samples and at end of each analytical batch	±15% expected response or concentration; breakdown criteria: DDT <15% Endrin <15%, <20% total
GC-HPLC	SW-846 8310	5 for linear 6 for quadratic	≤20% RSD use average CF or regression, >20% must use regression	As needed, when CCV >15% expected response or concentration	As needed, with analysis of each curve	80-120% recovery	Before and after every 10 samples and at end of each analytical batch	±15% expected response or concentration

GC/MS-Volatiles	SW-846 8260	5 for linear 6 for quadratic	CCCs – %RSD ≤30% 1,1-dichloroethene, chloroform, 1,2-dichloropropane, toluene ethyl benzene, vinyl chloride, all other target analytes ≤15% use average RF for quantitation, otherwise regression SPCCs – average RF ≥ 0.10 for chloromethane, 1,1-dichloroethane and bromoform; ≥ 0.30 for 1,1,2,2-tetrachloroethene and chlorobenzene	As needed, when CCV fails	As needed, with analysis of each curve	80-120% recovery	12 hours	8260: CCCs – % Difference or drift ≤20%, all other target analytes within 20% expected value, high recovery acceptable when analyte not present in sample; SPCCs same criteria as initial calibration
	EPA 624	3	<35% RSD for all compounds use average RF, otherwise use regression				24 hours	Recovery of all analytes must meet recoveries specified in Table 5

GC/MS-Semi-volatiles	SW-846-8270	5 for linear 6 for quadratic	CCCs – %RSD ≤30% acenaphthene, 1,4-dichlorobenzene, hexachlorobutadiene, N-nitroso-diphenylamine, di-n-octylphthalate, fluoranthene, benzo(a)pyrene, 4-chloro-3-methylphenol, 2,4-dichlorophenol, 2-nitrophenol, phenol, pentachlorophenol, 2,4,6-trichlorophenol, all other target analytes ≤15% use average RF for quantitation, otherwise regression SPCCs – average RF ≥0.05 N-nitrosodi-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, 4-nitrophenol	As needed, when CCV fails	As needed, with analysis of each curve	80-120% recovery	12 hours	8270: CCCs % Difference or drift ≤20%; all other target analytes within 20% expected value, high recovery acceptable when analyte not present in sample; SPCCs same criteria as initial calibration
	EPA 625	3	<35% RSD for all compounds use average RF, otherwise use regression				24 hours	80-120% recovery

TABLE 5

Quality Control Sample Types

Blank Type	Abbreviation	Description	Frequency of Use
Method Preparation Blank	MPB	This blank has been carried through the entire analytical process including any pretreatment procedures. The MPB will monitor any contaminants that may affect the sample results. General acceptance limits for the MPB are less than the test reporting Limit. If contamination is detected in the MPB above the reporting limit, all samples with analyte concentrations within 10x that found in the MPB must be flagged for re-extraction or digestion. If it is not possible to re-prep the samples then all analyses for that batch must be qualified.	One per analytical batch
Daily Instrument Analytical Blank	BLK	Analyzed once per day and/or at the beginning of analytical operations, this blank is used to detect any contamination in the instrument system.	One per day or per analytical batch

TABLE 5

Quality Control Sample Types

Blank Type	Abbreviation	Description	Frequency of Use
Initial Calibration Blank	ICB	This is reagent blank that is analyzed as a sample after a calibration curve has been generated for an analysis. Acceptance limits for an ICB are ± the Test Reporting Limit. If the ICB is outside these limits, the instrument must be recalibrated and the ICB reanalyzed.	One per analytical batch or as specified in the analytical method.

TABLE 5

Quality Control Sample Types

Blank Type	Abbreviation	Description	Frequency of Use
Continuing Calibration Blank	CCB	The continuing calibration blank is a reagent blank that is analyzed as a sample, generally after 10 samples have been tested. The CCB must be run prior to re-zeroing an instrument, unless this practice was performed for each previous sample. The CCB will verify whether significant instrument drift has occurred during the analytical run near the test method detection limit. General acceptance limits are ± the test reporting limit. If the CCB falls outside the acceptance limits, the instrument must be recalibrated and the previous 10 samples reanalyzed. For automated tests where run data is generated after all analyses are completed, 10 samples before and after the unacceptable CCB must be reanalyzed, i.e., all sample results must be encased in acceptable CCB. The reanalysis must also include the ICB and ICV QC samples.	Every ten samples/or as specified in the analytical method.

TABLE 5

Quality Control Sample Types

Blank Type	Abbreviation	Description	Frequency of Use
Field Trip Blank	FTB	These are used with VOA vials where there is the possibility that organic contaminants may diffuse through the PTFE-faced silicone rubber septum of the sample vial. A field trip blank vial filled with organic-free water accompanies the sample containers to and from a client location, at the discretion of the client, may be analyzed along with the samples.	One per sample shipping container
Storage Blank	STB	Reagent-grade water (40 mL aliquot) is stored with samples in a client set. Per the discretion of the client, it may be analyzed after all samples in that set are analyzed. The purpose is to determine the level of contamination acquired during storage.	One per sample storage refrigerator or client sample set (if required)

TABLE 5

Quality Control Sample Types

CONTROL SAMPLES

Control Type	Abbreviation	Description	Frequency of Use
Laboratory Fortified Blank or Blank Spike	LFB or BS	This is a fortified method preparation blank in which an aliquot of de-ionized water has been spiked with a known amount of a stock reference standard or spiking solution. A blank spike is required for each digestion or distillation batch. The purpose of the blank spike is to verify the analyst's spiking procedure and assure that any matrix interference shown by the spike and spike duplicate is really matrix induced.	One per analytical batch or as specified in the analytical method

TABLE 5

Quality Control Sample Types

CONTROL SAMPLES

Control Type	Abbreviation	Description	Frequency of Use
Laboratory Control Sample or Second-Source Calibration Verification	LCS or SCV	The LCS is a water reference sample of known value traceable to reliable commercial vendors such as APG, ERA; or NIST or EPA. This sample may also be prepared in the laboratory using a source dissimilar to that used in the quantitation standard. The purpose of the LCS is to validate the accuracy of the calibration procedure. A BLK is usually analyzed prior to the analysis of the LCS. Acceptance limits for this QC type are based on a 95% confidence limit generated from historical data for this test. Also, a particular test method may have published acceptance limits for the LCS. If the LCS falls outside the established limits, the analytical batch must be flagged for re-extraction, re-digestion, or reanalysis. It is impossible to repeat the analysis (e.g. BOD test) then all data for the batch must be qualified.	One per analytical batch or per new calibration curve (organic analyses)

TABLE 5

Quality Control Sample Types

Control Type	Abbreviation	Description	Frequency of Use
Initial Calibration Verification	ICV	The initial calibration standard is a mid-range standard. Generally the mid-range calibration standard from the same stock is used. This standard is analyzed as a sample and compared with the standard curve. The ICV checks the precision of the curve. Acceptance limits for this standard are ± 10%, or as stated in a particular method.	Once per analytical batch or as specified in the analytical method

TABLE 5

Quality Control Sample Types

Control Type	Abbreviation	Description	Frequency of Use
Continuing Calibration Verification	CCV	The continuing calibration verification is generally the same midrange standard that was analyzed as the ICV. The standard is analyzed as a sample and compared with the standard curve. The CCV will reveal any significant instrument drift. Acceptance limits for this QC type are ± 10%, or as stated in a particular method. If the CCV falls outside the acceptance window, the instrument must be recalibrated and the previous 10 samples reanalyzed. For automated tests where run data is generated after all analysis is complete, all samples run after the last acceptable CCV must be reanalyzed, i.e. all samples must be bracketed by an acceptable CCV. The reanalysis must include the ICB and ICV QC types.	Every 10 samples or as specified in the analytical method

TABLE 5

Quality Control Sample Types

Control Type	Abbreviation	Description	Frequency of Use
Contract Required	CRDL	A standard which contains the minimum level of detection acceptable under a contract Statement of Work must be analyzed for particular contract sample sets to demonstrate that detection limit can be met.	One per analytical batch for certain contract sample sets and methods only.
MATRIX QC SAMPLES			
Sample Matrix Spike	SPK	The sample matrix spike is an aliquot of a sample that has been spiked with a known amount of a stock reference standard or spiking solution. A the purpose of the SPK is to monitor sample matrix effects on the test. Acceptance limits for this QC type are based on the 95% confidence limits established for a test and matrix.	Every 10 samples for each matrix type, or as specified in the analytical method

TABLE 5

Quality Control Sample Types

Matrix QC Type	Abbreviation	Description	Frequency of Use
Matrix Spike Duplicate	MSD	A matrix spike duplicate is an aliquot of the same sample used for the matrix spike (SPK). A spike duplicate is required for each matrix type within a digestion or distillation batch. A spike duplicate analysis may be required on a non-distilled or non-digested sample if the spike has indicated a matrix interference. The purpose of this duplicate spike is to confirm any matrix effects on the test. Acceptance limits for this QC type are based on the 95% confidence limits established for a test and matrix.	Every 10 samples for each matrix type or as specified in the analytical method
Sample Duplicate	DUP	The sample duplicate is a replicate analysis of a particular sample that has been analyzed previously during the sample analytical batch. The purpose of the duplicate is to monitor precision within the analytical process.	Every 10 samples for each matrix type

TABLE 5

Quality Control Sample Types

Matrix QC Type	Abbreviation	Description	Frequency of Use
Field Duplicate	FDUP	This may be required to evaluate the uniformity of samples and sampling techniques at a field location. Acceptance limits for this QC type are based on established confidence limits, with generally two levels or ranges. The first range extends from the test reporting limit to 10x the test reporting limit. The second range encompasses any values higher than 10x the MDL.	As required on a project basis
Post-Digestion Spike	PDS	The post-digestion spike may be required, on a project basis, when a matrix precludes the use of pre-digestion spike.	One per analytical batch when required by project

TABLE 5

Quality Control Sample Types

MISCELLANEOUS QC SAMPLES

	Abbreviation	Description	Frequency of Use
Surrogate Spike	SUR	For almost all organic analyses, the analytical method requires surrogate compounds to be added to every blank, sample, matrix spike, matrix spike duplicate, and standard. Surrogate compounds are used to measure analytical efficiency by measuring percent recovery from the known value. They are generally brominated, fluorinated, or isotopically labeled compounds not typically detected in environmental samples.	Every QC and per batch for semi-volatile, volatile, pesticide, PCB analysis
Internal Standard	IST	These are compounds added to every standard, blank, matrix spike, matrix spike duplicate, sample (for volatiles), at a known concentration, prior to analysis. Internal standards are used as the basis of quantitation of the target compounds.	Every QC and client sample per batch for volatiles and semi-volatiles

Appendix AA

TriMatrix Laboratories, Inc.

Pipet Calibration Verification Acceptance Window Calculations

Pipet ID:	B-8	**Balance Used:**	IN-1
Manufacturer:	Fisher	**Manufacturer:**	Mettler
Model Number:	Labsystems	**Model Number:**	AE-163
Serial Number:	K88904	**Serial Number:**	B86211

I. 20 Weight (g) Measurements Using Each Pipet Calibration Mass

Date	Replicate Number	Volume 1 uL 20	Volume 2 uL 50	Volume 3 uL 100
7/28/1999	1	0.0208	0.0501	0.1003
7/28/1999	2	0.0209	0.0502	0.1001
7/28/1999	3	0.0204	0.0504	0.0998
7/28/1999	4	0.0203	0.0500	0.1002
7/28/1999	5	0.0206	0.0502	0.1003
7/28/1999	6	0.0205	0.0503	0.1003
7/28/1999	7	0.0206	0.0501	0.1002
7/29/1999	8	0.0210	0.0503	0.1016
7/29/1999	9	0.0207	0.0506	0.1014
7/29/1999	10	0.0209	0.0505	0.1013
7/29/1999	11	0.0208	0.0502	0.1012
7/29/1999	12	0.0208	0.0504	0.1010
7/29/1999	13	0.0211	0.0502	0.1012
7/29/1999	14	0.0213	0.0499	0.1009
7/30/1999	15	0.0205	0.0501	0.1002
7/30/1999	16	0.0210	0.0503	0.1001
7/30/1999	17	0.0209	0.0501	0.0998
7/30/1999	18	0.0208	0.0503	0.0998
7/30/1999	19	0.0206	0.0504	0.0995
7/30/1999	20	0.0210	0.0503	0.0996

II. Pipet Calibration Acceptance Window Calculations

Standard Deviation:	0.00025105	0.00017006	0.00064759
Random Error:	0.00075315	0.00051019	0.00194276
Average Percent Recovery	103.9%	100.5%	100.4%
Acceptance Window Low:	0.0192	0.0495	0.0981
Acceptance Window High:	0.0208	0.0505	0.1019

TriMatrix Laboratories, Inc.

Metals Laboratory Spiking Pipet Calibration Logbook

Pipet ID	Calibration Volume	Acceptance Window (g)	Date: Initials:		Date: Initials:		Date: Initials:		Date: Initials:		Date: Initials:	
			g Found	Pass/Fail	g Found	Pass/Fail	g Found	Pass/Fail	g Found	Pass/Fail	g Found	Pass/Fail
B-8	20 uL	0.0192-0.0208										
	50 uL	0.0495-0.0505										
	100 uL	0.0981-0.1019										
SPK-5	10 uL	0.0096-0.0104										
	25 uL	0.0245-0.0255										
	50 uL	0.0485-0.0515										
	100 uL	0.0982-0.1018										
SPK-15	100 uL	0.0970-0.1030										
	200 uL	0.1955-0.2045										
	250 uL	0.2461-0.2539										
	300 uL	0.2953-0.3047										
	500 uL	0.4859-0.5141										
	1000 uL	0.9806-1.0194										
SPK-16	100 uL	0.0953-0.1047										
	200 uL	0.1944-0.2056										
	250 uL	0.2457-0.2543										
	300 uL	0.2918-0.3082										
	500 uL	0.4922-0.5078										
	1000 uL	0.9641-1.0359										
SPK-17	200 uL	0.1905-0.2095										
	500 uL	0.4911-0.5089										
	1000 uL	0.9863-1.0137										

Appendix AB

TriMatrix Laboratories, Inc.

UNCONTROLLED COPY

STANDARD OPERATING PROCEDURE

Diesel Range Organics (DRO)

SW-846 Method 8015B

APPROVALS:

Area Supervisor: Janet M. Kudirka Date: 9/1/4
Janet M. Kudirka

QA Officer: Tom C. Boocher Date: 8-25-04
Tom C. Boocher

Operations Manager: Jeff P. Glaser Date: 8/25/04
Jeff P. Glaser

Procedure Number: GR-03-122
Revision Number: 2.2

Date Initiated: 6/28/95
Effective Date: 9/15/04

Date Revised: 8/25/04
Pages Revised: All

By: Jeff P. Glaser

Total Number of Pages: 23

If signed below, the last annual review required no procedural revision.

Date Reviewed	Reviewed by	Review Expires
9/22/06		9/22/07

1.0 SCOPE AND APPLICATION

1.1 Analytes

1.1.1 This procedure is designed to measure Diesel Range Organics (DRO) in water and soil extracts. The analysis corresponds to an alkane range of C_{10} - C_{28} and a boiling point range of approximately 170° C and 430° C.

1.1.2 Diesel Range Organics measures mid-range petroleum products such as diesel or fuel oil. Components greater than C28 present in products such as motor oils or lubrication oils are detectable under conditions of the method. If, based on review of chromatogram, the presence of these product types is suspected, additional efforts may be performed including, but not limited to, analysis of additional reference materials. These additional efforts are not contained within this procedure.

1.2 Quantitation Limits

1.2.1 Quantitation limits are 0.2 mg/L for water and 6.7 mg/kg for soil.

1.3 Dynamic Range

1.3.1 Dilutions must be performed as necessary to put extract concentrations within the linear range of calibration. In general, the individual compound range is 12.5 ug/mL to 400 ug/mL in the final extract. This approximates 125 ug/mL to 4000 ug/mL of DRO.

1.4 Experience

1.4.1 This procedure is based on solvent extraction and gas chromatography (GC), and must be used by or under the supervision of experienced analysts.

1.4.2 Analysts must be skilled in chromatographic interpretation as a quantitative tool.

2.0 PRINCIPLE METHOD REFERENCES

2.1 *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846,* 3rd Edition, Final Update III, Revision 2, December, 1996, Method 8015B, "Nonhalogenated Organics Using GC/FID"

2.2 *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846,* 3rd Edition, Final Update III, Revision 2, December, 1996, Method 8000, "Determinative Chromatographic Separations"

3.0 SUMMARY OF PROCEDURE

3.1 One liter of water or thirty grams of soil are spiked with o-terphenyl surrogate and extracted with methylene chloride. Extracts are dried and concentrated to 1.0 mL, then injected into a capillary column gas chromatograph, equipped with a Flame Ionization Detector (FID). Quantitation is performed by comparing

Appendix AC

Date: **/**/**

Dear **********,

ISO/IEC 17025 Standards require that a laboratory maintain a registry of all the subcontract laboratories it employs. Section 4.5.4 of the Standard specifies that records associated with this registry include evidence that documents the subcontract laboratory is ISO/IEC 17025 certified. For the ********* project you have requested the analysis for ****** be subcontracted to a laboratory that does not appear in our registry, and may not be ISO/IEC 17025 certified. Please complete the information requested below so that we may update our records and document your specification of the subcontract laboratory.

Subcontract Laboratory Name: _____

Address: _____ Contact: _____

_____ Phone Number: _____

_____ Email Address: _____

TriMatrix makes no claims to the accuracy or validity of subcontracted data. The following statement will be included in the case narrative portion of your data report:

Client authorization has been approved for all subcontracted samples. Laboratories receiving subcontracted samples have been either specified by the client, or when chosen by TriMatrix, are ISO/IEC 17025 certified. Subcontracted data has been reported as an attachment to the TriMatrix data package. TriMatrix Laboratories, Inc. makes no claims to the accuracy or validity of any subcontracted data.

The subcontracted analytical report will be included in its entirety as an attachment to the TriMatrix data package. When Electronic Data Deliverables are requested, subcontracted data will be included only when the EDD is formatted as a parsed out Excel file.

TriMatrix requires client written authorization when subcontracting analytical work. The information and your signature below provides this authorization:

Approved by (Signature): _____ Date: _____

Name (print): _____ Phone Number: _____

Company: _____

Address: _____

_____

_____

Please fax this form back to me at 616-942-7463. Please inform me if at any time your approval status of this subcontract laboratory changes. Thank you for your time.

Sincerely,

Name*********
Project Chemist
TriMatrix Laboratories, Inc.

Date: **/**/**

Dear **********,

For the ********* project, you have requested us to perform an analysis for *******, a procedure we are currently not capable of conducting. Because of this we will be subcontracting the analytical work to the laboratory specified below:

Subcontract Laboratory Name: *********
Address: *********
****
****

TriMatrix makes no claims to the accuracy or validity of subcontracted data. The following statement will be included in the case narrative portion of your data report:

Client authorization has been approved for all subcontracted samples. Laboratories receiving subcontracted samples have been either specified by the client, or when chosen by TriMatrix, are ISO/IEC 17025 certified. Subcontracted data has been reported as an attachment to the TriMatrix data package. TriMatrix Laboratories, Inc. makes no claims to the accuracy or validity of any subcontracted data.

The subcontracted analytical report will be included in its entirety as an attachment to the TriMatrix data package. When Electronic Data Deliverables are requested, subcontracted data will be included only when the EDD is formatted as a parsed out Excel file.

TriMatrix requires client written authorization when subcontracting analytical work. The information and your signature below provides this authorization:

Approved by (Signature): _____ Date: _____

Name (print): _____ Phone Number: _____

Company: _____

Address: _____

_____

_____

Please fax this form back to me at 616-942-7463. Please inform me if at any time your approval status of this subcontract laboratory changes. Thank you for your time.

Sincerely,

Name*********
Project Chemist
TriMatrix Laboratories, Inc.

Appendix AD

TriMatrix Laboratories, Inc.

Sample Collection, Packing and Return

All supplied containers are pre-cleaned, no additional cleaning is required. Some containers have preservatives present in them. Please do not rinse or overfill. Removal of some or all of the preservative may result in qualified data. Most of the chemicals used as preservatives are hazardous. Use caution when handling. Do not breathe or come in physical contact with these chemicals. For your safety, please read the enclosed Material Safety Data Sheets.

When conducting soil sampling, please clean off any residual soil from the outside of the containers. This will help prevent cross contamination of other samples in the cooler.

Please fill out all sample identification tags as completely as possible.

Please fill out the enclosed Chain of Custody form for adequate sample tracking.

The temperature requirement for the receipt of most environmental samples is 4 ±2° C. Temperatures that exceed this range are subject to qualification and data rejection by regulatory agencies. Following the instructions below provides the best chance of achieving and maintaining this temperature and avoiding qualified data.

- Samples should be collected and placed on ice as soon as possible. It is much more difficult to cool down warm samples.
- When possible, sample containers should be sealed in zip-lock containers. This prevents cross contamination and protects the sample labels from moisture that could render them illegible.
- Do not overfill the cooler with samples. Overfilling the cooler limits the space available for ice.
- Surround the sides and the tops of the sample containers with loose, cubed, ice. Surrounding the samples with ice is the most efficient way of cooling them. Do not use individual small bags of ice. Do not simply lay a bag of ice on top of the samples.
- Place the temperature blank in a representative location in the cooler, not in the middle of a bag of ice.
- Secure all paperwork in a zip-lock bag and place in the cooler. Seal the cooler closed.
- When shipping the coolers back to TriMatrix, complete the enclosed FedEx Airbill and attach it to the cooler. Samples shipped during the week for standard overnight delivery typically arrive the next day between 9:00 and 10:00 a.m. Saturday deliveries must be approved by your project chemist. When shipping samples for a Saturday delivery, select Priority Overnight and Saturday Delivery on the FedEx Airbill.

Please call your TriMatrix project chemist at 1-616-975-4500 if you require any further instructions, or to notify them of the pending arrival of any non-scheduled samples.

Thank You,
TriMatrix Laboratories, Inc.

Material Safety Data Sheet

Sodium hydroxide, 50 wt% solution in water

ACC# 95586

Section 1 - Chemical Product and Company Identification

MSDS Name: Sodium hydroxide, 50 wt% solution in water
Catalog Numbers: AC259860000, AC259860025, AC259860050, AC259860250
Synonyms: Caustic soda; Soda lye; Sodium hydrate.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
1310-73-2	Sodium hydroxide	50	215-185-5
7732-18-5	Water	50	231-791-2

Hazard Symbols: C
Risk Phrases: 35

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear liquid. **Danger!** Corrosive. Causes eye and skin burns. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns.
Target Organs: Eyes, skin, mucous membranes.

Potential Health Effects
Eye: Causes eye burns. May cause chemical conjunctivitis and corneal damage.
Skin: Causes skin burns. May cause deep, penetrating ulcers of the skin. May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.
Ingestion: May cause severe and permanent damage to the digestive tract. Causes gastrointestinal tract burns. May cause perforation of the digestive tract. Causes severe pain, nausea, vomiting, diarrhea, and shock. May cause systemic effects.
Inhalation: Irritation may lead to chemical pneumonitis and pulmonary edema. Causes severe irritation of upper respiratory tract with coughing, burns, breathing difficulty, and possible coma. Causes chemical burns to the respiratory tract. Aspiration may lead to pulmonary edema. May cause systemic effects.
Chronic: Prolonged or repeated skin contact may cause dermatitis. Effects may be delayed.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid immediately.

Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.
Ingestion: If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Use water with caution and in flooding amounts. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. Non-combustible, substance itself does not burn but may decompose upon heating to produce irritating, corrosive and/or toxic fumes.
Extinguishing Media: Do NOT get water inside containers. For small fires, use dry chemical, carbon dioxide, or water spray. For large fires, use dry chemical, carbon dioxide, alcohol-resistant foam, or water spray. Cool containers with flooding quantities of water until well after fire is out.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 0; Instability: 1

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Use only in a well-ventilated area. Do not breathe dust, vapor, mist, or gas. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Discard contaminated shoes.
Storage: Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from strong acids. Keep away from metals. Keep away from flammable liquids. Keep away from organic halogens.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Sodium hydroxide	2 mg/m3 Ceiling	10 mg/m3 IDLH	2 mg/m3 TWA
Water	none listed	none listed	none listed

OSHA Vacated PELs: Sodium hydroxide: No OSHA Vacated PELs are listed for this chemical. Water: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear chemical goggles and face shield.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear
Odor: none reported
pH: Alkaline
Vapor Pressure: 14 mm Hg
Vapor Density: >1.0
Evaporation Rate: Not available.
Viscosity: >1 (ether=1)
Boiling Point: > 100 deg C
Freezing/Melting Point:> 0 deg C
Decomposition Temperature: Not available.
Solubility: Completely soluble in water.
Specific Gravity/Density:>1.000
Molecular Formula: Solution
Molecular Weight: Not available.

Section 10 - Stability and Reactivity

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions.
Conditions to Avoid: Extreme temperatures.
Incompatibilities with Other Materials: Metals, flammable liquids, acids, nitromethane, nitro compounds, halogenated organics (e.g. dibromoethane, hexachlorobenzene, methyl chloride, trichloroethylene).
Hazardous Decomposition Products: Toxic fumes of sodium oxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 1310-73-2: WB4900000
CAS# 7732-18-5: ZC0110000
LD50/LC50:
CAS# 1310-73-2:

Draize test, rabbit, eye: 400 ug Mild;
Draize test, rabbit, eye: 1% Severe;
Draize test, rabbit, eye: 50 ug/24H Severe;
Draize test, rabbit, eye: 1 mg/24H Severe;
Draize test, rabbit, skin: 500 mg/24H Severe;
CAS# 7732-18-5:
Oral, rat: LD50 = >90 mL/kg;
Carcinogenicity:
CAS# 1310-73-2: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA. CAS# 7732-18-5: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology: No information found.
Teratogenicity: No information found.
Reproductive Effects: No information found.
Neurotoxicity: No information found.
Mutagenicity: No information found.
Other Studies: See actual entry in RTECS for complete information.

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	SODIUM HYDROXIDE SOLUTION				No information available.
Hazard Class:	8				
UN Number:	UN1824				
Packing Group:	II				

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 1310-73-2 is listed on the TSCA inventory.
CAS# 7732-18-5 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

CERCLA Hazardous Substances and corresponding RQs
CAS# 1310-73-2: 1000 lb final RQ; 454 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 1310-73-2: acute, reactive.
Section 313
No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants. This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 1310-73-2 is listed as a Hazardous Substance under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 1310-73-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
C
Risk Phrases:
R 35 Causes severe burns.

Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 37/39 Wear suitable gloves and eye/face protection.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)
CAS# 1310-73-2: 1
CAS# 7732-18-5: No information available.
Canada - DSL/NDSL
CAS# 1310-73-2 is listed on Canada's DSL List.
CAS# 7732-18-5 is listed on Canada's DSL List.
Canada - WHMIS
This product does not have a WHMIS classification.
Canadian Ingredient Disclosure List
CAS# 1310-73-2 is listed on the Canadian Ingredient Disclosure List.
Exposure Limits
CAS# 1310-73-2: OEL-AUSTRALIA:TWA 2 mg/m3 OEL-BELGIUM:STEL 2 mg/m3

OEL-DENMARK:TWA 2 mg/m3 OEL-FINLAND:TWA 2 mg/m3 OEL-FRANCE:TWA 2 mg /m3 OEL-GERMANY:TWA 2 mg/m3 OEL-JAPAN:STEL 2 mg/m3 OEL-THE NETHERLA NDS:TWA 2 mg/m3 OEL-THE PHILIPPINES:TWA 2 mg/m3 OEL-SWEDEN:TWA 2 mg/ m3 OEL-SWITZERLAND:TWA 2 mg/m3;STEL 4 mg/m3 OEL-THAILAND:TWA 2 mg/m3 OEL-TURKEY:TWA 2 mg/m3 OEL-UNITED KINGDOM:TWA 2 mg/m3;STEL 2 mg/m3 OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

Section 16 - Additional Information

MSDS Creation Date: 6/24/1997
Revision #7 Date: 11/12/2001

TriMatrix Laboratories, Inc.

IMPORTANT INFORMATION FOR THE COLLECTION OF VOLATILE ORGANIC DRINKING WATER SAMPLES

Open the water tap and allow the system to flush until the water temperature has stabilized (usually about 10 minutes). Reduce the water flow and carefully collect a set of duplicate samples. It is important that the flow is slow enough that no air bubbles pass through the sample as the vial is being filled. Each 40 mL vial has been pre-preserved with 25 mg of ascorbic acid preservative. Fill sample vials to just overflowing, taking care not to flush out the ascorbic acid.

Prior to sealing the set of vials, each sample must also be preserved with 1:1 hydrochloric acid. Using the supplied eyedropper and vial of HCl, carefully add 2 drops of HCl to each vial. The HCl must be added after the collection of the sample. DO NOT add the HCl to the sample vial prior to collecting the sample.

CAUTION: The 1:1 HCl is very acidic. Handle with care.

NOTE: If the sample foams vigorously when the HCl is added, discard that set of samples. Collect a new set, omitting the addition of the HCl. These samples must be flagged as "not acidified" on the chain of custody.

Seal the vials, invert, and mix for 1 minute. Verify that the sealed and mixed vial is bubble and headspace free. Sample data generated from vials received with headspace will be qualified accordingly.

The samples must be chilled to about 4° C when collected, and maintained at that temperature until analysis. Samples must be packaged for shipment with sufficient ice to ensure they arrive at the laboratory with a substantial amount of ice remaining in the cooler. Do not use Blue Ice. Surrounding the samples with crushed or cubed ice is strongly recommended. Samples received at the laboratory within 6 hours of collection may not have sufficient time to cool to 4° C. Provided that they have been correctly packed in ice, no qualifications will be necessary. Samples received in excess of 6 hours of the time of collection that exceed the required preservation temperature will be qualified accordingly.

Please call 1-616-975-4500 and speak to your project chemist if you have any questions. Thank you.

TriMatrix Laboratories, Inc.

Dissolved Sulfide Sample Collection and Preservation

To measure dissolved sulfide, insoluble matter in the sample must first be removed. This is accomplished by producing an aluminum hydroxide floc using sodium hydroxide and aluminum chloride. The flocculent is allowed to settle and the supernatant decanted off and preserved with zinc acetate. It is important that there is no headspace present in the bottle after the addition of the aluminum chloride. The vials containing the final decanted sample must also be headspace free. If you have any questions on the treatment procedures described below, please contact your project chemist at 1-616-975-4500.

Supplies

Quantity	*Item*
1 per sample	250 mL amber bottle containing 0.5 mL (10 drops) 6N NaOH
2 per sample	40 mL VOA vials, each containing 0.1 mL (2 drops) 2N Zinc Acetate per sample
2 or 3	eye droppers
1	Container of Aluminum Chloride. Enough has been sent to allow for the addition of 10 drops (0.5 mL) to each 250 mL sample.

Procedure

1.0 Collect the sample in the 250 mL amber bottle containing the NaOH. Completely fill the bottle (must be enough sample so when capped it is headspace free).

2.0 Immediately add 10 drops of the Aluminum Chloride solution.

3.0 Mix the sample by holding the bottle in an upright position and rotating your wrist back and forth for 1 minute.

4.0 Allow the sample to settle for 5 to 15 minutes (long enough to allow the flocculent to settle to the bottom of the bottle). Do not wait longer than is necessary to collect the 80 mL of supernatant.

5.0 Carefully decant the supernatant into the (2) 40 mL VOA vials containing the 2N zinc acetate. Completely fill the vials with sample so they are headspace free.

6.0 The sample remaining in the 250 mL amber bottle is caustic. Please return the partially filled bottle to TriMatrix for disposal.

TriMatrix Laboratories, Inc.

IMPORTANT INFORMATION FOR SULFIDE SAMPLE COLLECTION

The amber, 500 mL, light green-tagged bottles supplied for sulfide sample collection have been pre-preserved with 1 mL of 2N zinc acetate. Sulfide samples must also be preserved with sodium hydroxide to a pH of ≥9; however, to correctly preserve the sulfide in the sample the addition of the sodium hydroxide must be made *after* the sample has been combined with the zinc acetate. A 4 mL vial containing 2 mL of 10N sodium hydroxide has been included with every 500 mL sulfide sample bottle for this purpose.

With a minimum of aeration, fill a 500 mL bottle up to the neck with sample. Cap and gently swirl to mix the sample and the zinc acetate. Open the sample bottle and transfer all of the sodium hydroxide from one of the 4 mL vials. Carefully add more sample to fill the 500 mL bottle, cap and mix. The filled sample container should be headspace free.

CAUTION: The 10N sodium hydroxide solution is very caustic. Handle with care.

Please call 1-616-975-4500 and speak to your project chemist with any questions. Thank you.

TriMatrix Laboratories, Inc.

IMPORTANT INFORMATION FOR AVAILABLE CYANIDE SAMPLE COLLECTION

Two sample containers must be collected at each sample point. One container will be treated with lead carbonate and sodium hydroxide, and the second with only sodium hydroxide (see below and the attached flowchart). A form titled "Available Cyanide Sample Treatment Record" has been provided to document all field pre-treatment activities. Please complete it as you collect and treat each sample. If you have any questions on the treatment procedures described below, please contact your project chemist at 1-616-975-4500.

IMPORTANT: To avoid analyte loss it is **required** that all sample treatments occur within 15 minutes of sample collection.

CAUTION: All containers labeled as Sodium Hydroxide and Lead Carbonate/Sodium Hydroxide contain 1.25 mL of 10N sodium hydroxide. This solution is very caustic. Avoid skin contact. Handle with care.

CAUTION: All containers labeled as Lead Carbonate contain 0.25 g of solid lead carbonate. Avoid inhalation and skin contact.

1.0 Sample Collection Equipment

Per Sample
- One membrane filter
- One plastic powder funnel
- One sheet of filter paper
- One Lead Carbonate bottle
- One Lead Carbonate/Sodium Hydroxide bottle
- One Sodium Hydroxide bottle

A hand pump (not provided) is also required to perform this procedure

2.0 Collecting a Lead Carbonate/Sodium Hydroxide Pre-Treated Sample

If the sample contains particulates, begin with section 2.1. If the sample is particulate free, begin with section 2.2.

2.1 Sample Contains Particulate Matter

If the sample contains particulate matter that would be removed upon filtration, the sample must be filtered prior to the lead carbonate pre-treatment to avoid the loss of any cyanides associated with the particulate matter. Using a powder funnel and a sheet of filter paper, filter the sample into the bottle labeled Lead Carbonate. Filter enough sample to fill the bottle up to its neck. Place the used filter paper into the bottle labeled Lead Carbonate/Sodium Hydroxide. Cap the Lead Carbonate bottle and gently swirl to mix the sample and the lead carbonate. The sulfide will react with the lead carbonate

and precipitate out as lead sulfide. The sample must now be filtered through a membrane filter to prevent the loss of any cyanide through reaction with the precipitated lead sulfide. Using a new membrane filter apparatus and a hand pump, filter the sample. Transfer the filtrate into the Lead Carbonate/Sodium Hydroxide bottle containing the used filter paper. Do not pre-rinse the container or fill to overflowing, as a loss of the particulate matter and sodium hydroxide will result. Proceed to section 3.0.

2.2 Sample Particulate Free

With a minimum of aeration, fill the 250 mL bottle labeled Lead Carbonate up to the neck with sample. Cap and gently swirl to mix the sample and the lead carbonate. The sulfide will react with the lead carbonate and precipitate out as lead sulfide. The sample must now be filtered through a membrane filter to prevent the loss of any cyanide through reaction with the precipitated lead sulfide. Using a new membrane filter apparatus and a hand pump, filter the sample. Transfer the filtrate collected into the bottle labeled Lead Carbonate/Sodium Hydroxide. Do not pre-rinse the container or fill to overflowing to avoid the loss of the sodium hydroxide.

3.0 Collecting a Sodium Hydroxide Pre-Treated Sample

With a minimum of aeration fill the 250 mL bottle labeled Sodium Hydroxide with sample. Do not pre-rinse the container or fill to overflowing to avoid the loss of the sodium hydroxide.

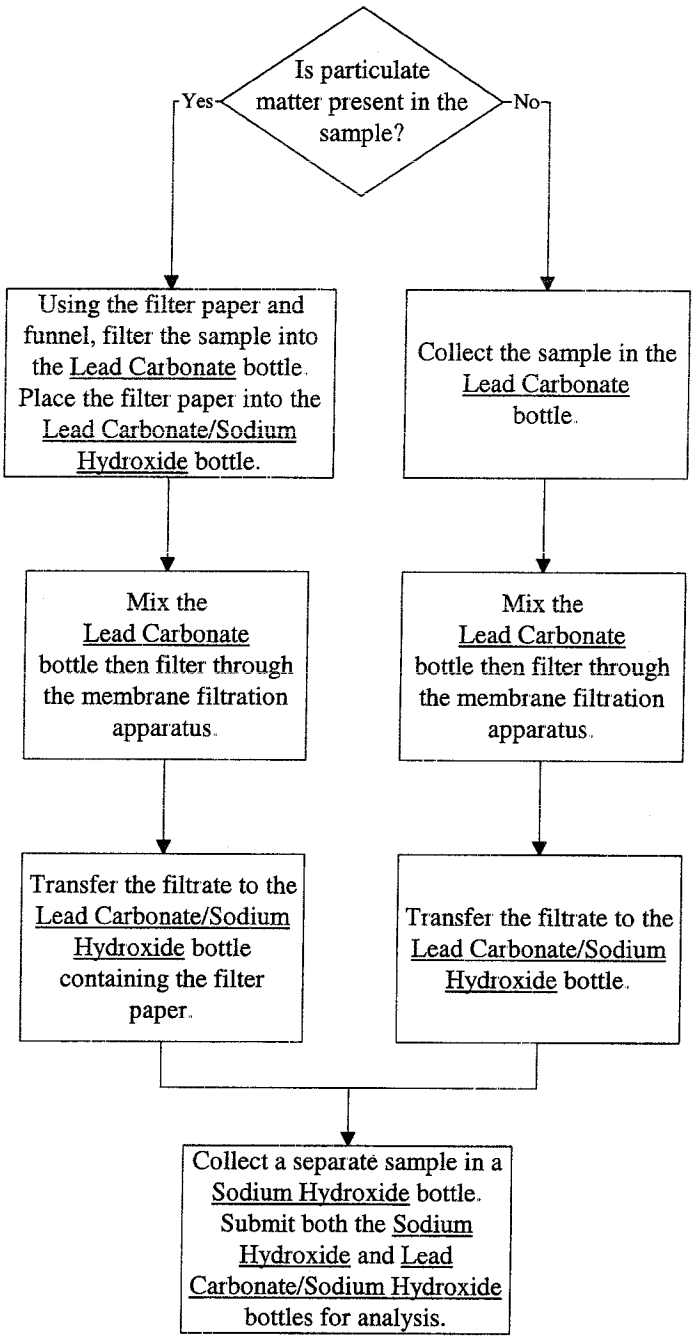
4.0 Collect all Paperwork and Return the Samples to TriMatrix

Place all samples in the cooler. Surround the samples with ice. To avoid data qualification all samples must be received at a temperature of between 0 and 4° C. Seal all paperwork in the resealable bag. Place the sealed bag containing the paperwork. Place all plastic powder funnels and unopened membrane filters in the cooler. Seal the cooler and return it to TriMatrix.

If you have any questions, please call TriMatrix at 1-616-975-4500 and speak with your project chemist. Thank you.

TriMatrix Laboratories, Inc.

Available Cyanide Sample Collection Flowchart



Appendix AE

TriMatrix Laboratories, Inc.
5560 Corporate Exchange Court SE Grand Rapids, MI 49512
Phone (616) 975-4500 Fax (616) 942-7463
www.trimatrixlabs.com

Chain of Custody Record

COC No.

Page ____ of ____

For Lab Use Only

Cart

WOA Rack/Tray

Receipt Log No.

Project Chemist

Laboratory Project No.

Client Name | Project Name

Address | Client Project No. / P.O. No.

Invoice To ☐ Client ☐ Other (comments)

Phone

Fax

Contact/Report To

Analyses Requested

⇦ PRESERVATIVES

A NONE pH~7
B HNO_3 pH<2
C H_2SO_4 pH<2
D 1+1 HCl pH<2
E NaOH pH>12
F ZnAc/NaOH pH>9
G MeOH
H Other (note below)

Test Group	Matrix Code	Laboratory Sample Number		Sample ID	Cooler ID	Sample Date	Sample Time	COMP	GRAB	Matrix	Container Type (corresponds to Container Packing List)	Number of Containers Submitted	Total	Sample Comments
			1											
			2											
			3											
			4											
			5											
			6											
			7											
			8											
			9											
			10											

Sampled By (print)

Sampler's Signature

Company

How Shipped? Hand Carrier_____

Tracking No.

Comments

1. Relinquished By	Date	Time	2. Relinquished By	Date	Time	3. Relinquished By	Date	Time

1. Received By	Date	Time	2. Received By	Date	Time	3. Received For Lab By	Date	Time

WHITE COPY - REPORT YELLOW COPY - LABORATORY PINK COPY - FIELD

revision 1.0

Appendix AF

TriMatrix Laboratories, Inc.

pH Strip Calibration Logbook

Date	Lot #	pH 4	pH 7	pH 10	Area

pH STRIP CALIBRATION CRITERIA CORRECTIVE ACTION

1. The acceptance range for the strips is to read the exact pH of the buffer being checked. The wide range strips must pass this criteria at all three levels, 4, 7, and 10. The narrow range pH 5-7 strips are only checked at a pH of 7.

2. If the pH strips do NOT read at their appropriate levels, that lot number must NOT be used. Return them to purchasing.

Appendix AG

SAMPLE COLLECTION GUIDELINES
BOTTLE AND PRESERVATIVE REQUIREMENTS

The collection of the sample is the starting point for the generation of quality data. It is the responsibility of TriMatrix to provide the client who collects the sample with sample collection instructions, which ensure sample integrity. Also, where applicable TriMatrix also supplies the client with appropriate clean sample containers and preservative chemicals; these glass containers are purchased new and certified as clean and vendors such as I-Chem Research and Fischer Scientific.

Sampling and Preservation Requirements for certain common environmental analyses are listed in the following table: (NOTE: Holding times are based on EPA guidelines for CLP, NPDES, and RCRA).

SAMPLE COLLECTION GUIDELINES
BOTTLE AND PRESERVATIVE REQUIREMENTS

Analyte	Matrix	Holding Time (from Date Sampled)	Preservation	Container	Minimum Sample Size	Method Reference	Container Tag Color
ORGANICS							
Volatile Halocarbons*	Water	7 days	4° C	2-40 mL VOA vials	40 mL each	8015, 8021, 8260	Yellow/Black
	Water	14 days	4° C	2-40 mL VOA vials	40 mL each	601	Yellow/Black
	Water	14 days	4° C/HCl to pH <2	2-40 mL VOA vials	40 mL each	601, 8015, 8021, 8260	Yellow
	Soil/Waste (High Level Bulk)	14 days	4° C	60 mL glass jar	fill the jar	8015, 8021, 8260	Light Yellow
	Soil (Low Level Bisulfate)	14 days	4° C/5 mL sodium bisulfate	2-pre-tared 40 mL VOA vials each containing 5 mL of 20% sodium bisulfate and a stir bar	5 g each	8015, 8021, 8260	Light Yellow
	Soil (Encore)	48 hours/14 days	4° C	10 or 25 g Encore	10 or 25 g	8015, 8021, 8260	Label on Bag
	Soil (MeOH Preserved)	14 days	4° C	Pre-tared 40 mL VOA vial and 10 mL ampule of methanol	10 g	8015, 8021, 8260	Light Yellow
Volatile Aromatics*	Water	7 days	4° C	2-40 mL VOA vials	40 mL each	602	Yellow/Black
	Water	14 days	4° C/HCl to pH <2.0	2-40 mL VOA vials	40 mL each	602, 8021, 8260	Yellow
	Soil/Waste (High Level Bulk)	14 days	4° C	60 mL glass jar or	fill the jar	8021, 8260	Light Yellow
	Soil (Low Level Bisulfate)	14 days	4° C/5 mL sodium bisulfate	2-pre-tared 40 mL VOA vials each containing 5 mL of 20% sodium bisulfate and a stir bar	5 g each	8021, 8260	Light Yellow
	Soil (Encore)	48 hours/14 days	4° C	10 or 25 g Encore	10 or 25 g	8021, 8260	Label on Bag
	Soil (MeOH Preserved)	14 days	4° C	Pre-tared 40 mL VOA vial and 10 mL ampule of methanol	10 g	8021, 8260	Light Yellow
Acrolein*	Water	3 days	4° C	2-40 mL VOA vials	40 mL each	624	Yellow/Black
	Water	14 days	4° C/HCl to pH 4-5	2-40 mL VOA vials	40 mL each	624	Yellow
Acrylonitrile*	Water	14 days	4° C	2-40 mL VOA vials	40 mL each	624	Yellow/Black
	Water	14 days	4°C/HCl to pH 4-5	2-40 mL VOA vials	40 mL each	624	Yellow
TPH-GRO	Water	7 days	4° C	2-40 mL VOA vials	40 mL each	8015	Yellow/Black
	Water	14 days	4° C/HCl to pH <2.0	2-40 mL VOA vials	40 mL each	8015	Yellow
TPH-GRO/PVOC	Water	14 days	4° C/HCl to pH <2.0	2-40 mL VOA vials	40 mL each	Wisconsin PUBL-SW-140	Yellow
TPH-GRO	Soil/Waste (High Level Bulk)	14 days	4° C	60 mL glass jar or	fill the jar	8015	Light Yellow
	Soil (Low Level Bisulfate)	14 days	4° C/5 mL sodium bisulfate	2-pre-tared 40 mL VOA vials each containing 5 mL of 20% sodium bisulfate and a stir bar	5 g each	8015	Light Yellow
	Soil (Encore)	48 hours/14 days	4° C	10 or 25 g Encore	10 or 25 g	8015	Label on Bag
	Soil (MeOH Preserved)	14 days	4° C	Pre-tared 40 mL VOA vial and 10 mL ampule of methanol	10 g	8015	Light Yellow
TPH-GRO/PVOC	Soil (Encore)	48 hours/21 days	4° C	10 or 25 g Encore	See Table 1 in Method	Wisconsin PUBL-SW-140	Label on Bag

SAMPLE COLLECTION GUIDELINES
BOTTLE AND PRESERVATIVE REQUIREMENTS

Analyte	Matrix	Holding Time (from Date Sampled)	Preservation	Container	Minimum Sample Size	Method Reference	Container Tag Color
	Soil (MeOH Preserved)	14 days	4° C	Pre-tared 40 mL VOA vial and 10 mL ampule of methanol	10 g	Wisconsin PUBL-SW-140	Light Yellow
Petroleum Hydrocarbons (DRO)	Water	7 days/47 days	4° C	1000 mL glass bottle	1000 mL	8015	Salmon
	Water	7 days/47 days	4° C/HCl to pH <2.0	1000 mL glass bottle	1000 mL	Wisconsin PUBL-SW-141	Gray
	Soil/Waste (High Level Bulk)	14 days/54 days	4° C	60 mL glass jar or	fill the jar	8015	Manila
	Soil/Waste	10 days/47 days	4° C	Tared VOC vial	See Table 1 in Method	Wisconsin PUBL-SW-141	Gray
Pesticides	Water	7 days/47 days	4° C/pH 5-9	1000 mL glass bottle	1000 mL	608	Yellow/White
PCBs	Water	7 days/47 days	4° C	1000 mL glass bottle	1000 mL	608, 8082	Salmon
Methoxychlor	Water	7 days/47 days	4° C/pH 6-8	1000 mL glass bottle	1000 mL	608.2	Yellow/White
Pesticides	Soil/Waste	14 days/54 days	4° C	60 mL glass jar	fill the jar	8081	Manila
PCBs	Soil/Waste	14 days/54 days	4° C	60 mL glass jar	fill the jar	8082	Manila
PCB Oils	Oil	N/A	None	40 mL VOA vial	20 mL	8082	Manila
Organo-phosphorous	Water	7 days/47 days	4° C	1000 mL glass bottle	1000 mL	8141	Salmon
Pesticides	Soil/Waste	14 days/54 days	4° C	60 mL glass jar	fill the jar	8141	Manila
Phenoxy Acid Herbicides	Water	7 days/47 days	4° C	1000 mL glass bottle	1000 mL	8151	Salmon
	Soil/Waste	14 days/54 days	4° C	60 mL glass jar	fill the jar	8151	Manila
Polynuclear aromatic	Water	7 days/47 days	4° C	1000 mL glass bottle	1000 mL	610, 8100	Salmon
Hydrocarbons*	Soil/Waste	14 days/54 days	4° C	60 mL glass jar	fill the jar	8310, 8270	Manila
Acid Extractables	Water	7 days/47 days	4° C	1000 mL glass bottle	1000 mL	8041, 8270	Salmon
	Soil/Waste	14 days/54 days	4° C	60 mL glass jar	fill the jar	8041, 8270	Manila
Base/Neutral Extractables	Water	7 days/47 days	4° C	1000 mL glass bottle	1000 mL	8270	Salmon
	Soil/Waste	14 days/54 days	4° C	60 mL glass jar	fill the jar	8270	Manila
TCLP-							
Volatiles	Soil/Waste	14 days/28 days	4° C	60 mL glass jar	100 g	1311	Yellow/Black
Semi-Volatiles	Soil/Waste	14 days/21 days/61 days	4° C	125 mL glass jar	250 g	1311	Manila
Metals	Soil/Waste	180 days/360 days (Hg-28 days/56 days)	None	125 mL glass jar	250 g	1311	Manila
Pesticide/Herbicide	Soil/Waste	14 days/21 days/61 days	4° C	125 mL glass jar	250 g	1311	Manila

SAMPLE COLLECTION GUIDELINES
BOTTLE AND PRESERVATIVE REQUIREMENTS

Analyte	Matrix	Holding Time (from Date Sampled)	Preservation	Container	Minimum Sample Size	Method Reference	Container Tag Color
Dioxins/ Furans	Water	7 days/47 days	4° C	1000 mL glass bottle	1000 mL	Screen-625	Salmon
	Soil/Waste	None Required	4° C	60 mL glass jar	fill the jar	Screen-625	Manila

SAMPLE COLLECTION GUIDELINES
BOTTLE AND PRESERVATIVE REQUIREMENTS

Analyte	Matrix	Holding Time (from Date Sampled)	Preservation	Container	Minimum Sample Size	Method Reference	Container Tag Color
METALS							
Metals, Total (including phosphorus)	Water	6 months	HNO_3 to pH <2.0	500 mL plastic bottle	500 mL	6010/6020/200.7/200.8	Red
Metals, Dissolved (including phosphorus)	Water	6 months	HNO_3 to pH <2.0	500 mL plastic bottle	500 mL	6010/6020/200.7/200.8	Red/White Stripe
	Soil/Waste	6 months	None	250 mL plastic bottle	50 g	6010/6020	White
Mercury Cold Vapor	Water	28 days	HNO_3 to pH <2.0	500 mL plastic bottle	500 mL	245.1, 7470	Red
	Soil/Waste	28 days	None	250 mL plastic bottle	50 g	7471	White
Low-Level	Water	28 days	None	500 mL borosilicate glass bottle**	500 mL	1631	Label on Bag

SAMPLE COLLECTION GUIDELINES
BOTTLE AND PRESERVATIVE REQUIREMENTS

Analyte	Matrix	Holding Time (from Date Sampled)	Preservation	Container	Minimum Sample Size	Method Reference	Container Tag Color
INORGANICS							
Color (Apparent)	Water	48 hours	4° C	125 mL plastic bottle	100 mL	110.2	Green
Color (True)	Water	48 hours	4° C	125 mL plastic bottle	100 mL	110.2	Green
Oil & Grease (HEM and SGT)	Water	28 days	4° C/H_2SO_4 to pH <2.0	1000 mL glass bottle	1000 mL	9070/1664	Dark Blue
	Soil/Waste	28 days	None	60 mL glass jar	50 g	9071	Manila
Specific Conductance	Water	28 days	4° C	125 mL plastic bottle	100 mL	2510 B./120.1/9050	Green
Acidity	Water	14 days	4° C	125 mL plastic bottle	100 mL	2310 B.	Green
pH	Water	24 hours	4° C	125 mL plastic bottle	100 mL	150.1/9041/4500-H B.	Green
	Soil/Waste	24 hours	4° C	60 mL glass jar	50 g	9040/9041/9045	
Alkalinity	Water	14 days	4° C	125 mL plastic bottle	100 mL	310.1/2320 B.	Green
Hardness	Water	6 months	HNO_3 to pH <2.0	125 mL plastic bottle	100 mL	130.2/2340 C.	Red
Biochemical Oxygen Demand (BOD)	Water	48 hours	4° C	1000 mL plastic bottle	1000 mL	5210 B.	Green
Chemical Oxygen Demand (COD)	Water	28 days	4° C/H_2SO_4 to pH <2.0	125 mL plastic bottle	100 mL	410.4/5220 D.	Dark Blue
Chromium (Hexavalent)	Water	24 hours	4° C	500 mL plastic bottle	500 mL	7196A, 3500-Cr B.	Green
	Soil/Waste	30 days/24 hours	4° C	60 mL glass jar	50 g	7196A	Manila
Organic Carbon (TOC)	Water	28 days	4° C/H_2SO_4 to pH <2.0	3-40 mL VOA vials	40 mL	415.1/5310 D./9060	Salmon
	Soil/Waste	28 days	4° C	60 mL glass jar	10 g	MSA 29-3.5.2/415.1/9060	Manila

SAMPLE COLLECTION GUIDELINES
BOTTLE AND PRESERVATIVE REQUIREMENTS

Analyte	Matrix	Holding Time (from Date Sampled)	Preservation	Container	Minimum Sample Size	Method Reference	Container Tag Color
Ortho-Phosphate	Water	48 hours	4° C	125 mL plastic bottle	100 mL	365.1/4500-P E.	Green
Total Phosphorus	Water	28 days	H_2SO_4 to pH <2.0	125 mL plastic bottle	100 mL	365.1/4500-P F.	Dark Blue
	Soil/Waste	28 days	4° C	60 mL glass jar	50 g	365.1/4500-P F.	Manila
Total Kjeldahl Nitrogen (TKN)	Water	28 days	4° C/H_2SO_4 to pH <2.0	125 mL plastic bottle	100 mL	351.2	Dark Blue
	Soil/Waste	28 days	4° C	60 mL glass jar	50 g	351.2	Manila
Ammonia	Water	28 days	4° C/H_2SO_4 to pH <2.0	125 mL plastic bottle (500 mL for wastewater)	100 mL (200 mL for wastewater)	350.1/4500-NH_3 G.	Dark Blue
	Soil/Waste	28 days	4° C	60 mL glass jar	50 g	350.1/4500-NH_3 G.	Manila
Nitrite	Water	48 hours	4° C	125 mL plastic bottle	100 mL	300.0/9056/353.2/354.1/ 4500 NO_2-B/4500 NO_2-F	Green
	Soil/Waste	28 days/48 hours	4° C	60 mL glass jar	50 g	353.2/9056	Manila
Nitrate	Water	48 hours	4° C	125 mL plastic bottle	100 mL	300.0/9056/353.2/4500 NO_3-F	Green
	Soil/Waste	28 days/48 hours	4° C	60 mL glass jar	50 g	9056/353.2/4500 NO_3-F	Manila
Nitrite plus Nitrate (No distinction between NO_2 and NO_3)	Water	28 days	4° C/H_2SO_4 to pH <2.0	125 mL plastic bottle	100 mL	353.2/4500 NO_3-F	Dark Blue
	Soil/Waste	28 days	4° C	60 mL glass jar	50 g	353.2/4500 NO_3-F	Manila
Total Volatile Solids	Water	7 days	4° C	125 mL plastic bottle	100 mL	160.4	Green
	Soil/Waste	7 days	4° C	60 mL glass jar	50 g	2540-G	Manila
Turbidity	Water	48 hours	4° C	125 mL plastic bottle	100 mL	180.1/2130 B.	Green
Sulfate	Water	28 days	4° C	125 mL plastic bottle	100 mL	300.0/9056/375.4/9038	Green
	Soil/Waste	28 days	4° C	60 mL glass jar	50 g	9056/375.2/9038/4500 SO_4-F	Manila
Sulfite	Water	48 hours	4° C/3 mL 1% EDTA	125 mL plastic bottle	100 mL	377.1	Manila

SAMPLE COLLECTION GUIDELINES
BOTTLE AND PRESERVATIVE REQUIREMENTS

Analyte	Matrix	Holding Time (from Date Sampled)	Preservation	Container	Minimum Sample Size	Method Reference	Container Tag Color
Sulfide	Water	7 days	4° C/Zinc Acetate in lab, NaOH in field	125 mL plastic bottle	100 mL	9034/376.1/376.2/4500 S_2-D 4500 S_2-F	Light Green
	Soil/Waste	7 days	4° C	60 mL glass jar	50 g	9034	Manila
Cyanide*	Water	14 days	4° C/NaOH to pH >12	1000 mL plastic bottle	1000 mL	335.2/335.4/9012/9014	Light Blue
	Soil/Waste	14 days	4° C	60 mL glass jar	50 g	9012/9014	Manila
Cyanide, Available	Water	14 days	1 Lead Carbonate bottle 1 Lead Carbnate/NaOH bottle 1 NaOH bottle	125 mL amber glass bottles	125 mL	OIA-1677	Light Blue
Coliform Fecal and Total	Water	24 hours	4° C/$Na_2S_2O_3$	Sterile plastic bottle or Whirl-Pak	100 mL	9222-D/9223-B	White
Bromide	Water	28 days	4° C	125 mL plastic bottle	100 mL	9056/ASTM D1246-88	Green
Chloride	Water	28 days	4° C	125 mL plastic bottle	100 mL	300.0/9056/325.2/4500-Cl E.	Green
	Soil	28 days	4° C	60 mL glass jar	50 g	9056/325.2/4500-Cl E.	Manila
Chlorine Residual	Water	Analyze Immediately	4° C	125 mL plastic bottle	100 mL	HACH-8167	Green
Total Solids (% Moisture)	Water	7 days	4° C	125 mL plastic bottle	100 mL	160.3/2540 B.	Green
	Soil/Waste	7 days	4° C	60 mL glass jar	50 g	3550	Manila
Total Dissolved Solids (TDS)	Water	7 days	4° C	1000 mL plastic bottle	1000 mL	160.1/2540 C.	Green
Total Suspended Solids (TSS)	Water	7 days	4° C	1000 mL plastic bottle	1000 mL	160.2/2540 D.	Green
Fluoride	Water	28 days	4° C	125 mL plastic bottle	100 mL	300.0/9056/4500-F C.	Green
	Soil	28 days	4° C	60 mL glass jar	50 g	9056	Manila

SAMPLE COLLECTION GUIDELINES
BOTTLE AND PRESERVATIVE REQUIREMENTS

Analyte	Matrix	Holding Time (from Date Sampled)	Preservation	Container	Minimum Sample Size	Method Reference	Container Tag Color
Organic Halogen (TOX)	Water	28 days	4° C/H_2SO_4 to pH <2.0	500 mL amber glass bottle	500 mL	9020	Lilac
	Soil	28 days	4° C	60 mL glass jar	50 g	9023	Manila
Phenolics	Water	28 days	4° C/H_2SO_4 to pH <2.0	500 mL amber glass bottle	100 mL	420.2/420.4/9066	Brown
	Soil	28 days	4° C	60 mL glass jar	50 g	9066	Manila
Surfactants (MBAS)	Water	48 hours	4° C	1000 mL plastic bottle	400 mL	425.1/5540 C.	Green
Flash Point	Solid/Liquid/Waste	N/A	None	(Appropriate to Sample)	100 g	1010/1020	White
	Waste	N/A	None	125 mL glass jar or 125 mL plastic bottle	100 g	1010/1020	White
Corrosivity (pH and Method 1110)	Waste	N/A	None	(Appropriate to Sample) 500 mL glass or plastic bottle	500 mL	9040/9041/1110	White
Paint Filter (Free Liquids)	Soil/Waste	N/A	None	(Appropriate to Sample) 250 mL glass jar or 125 mL plastic bottle	100 g	9095	White
Radiologicals (Alpha + Beta, Alpha, Beta, Ra 226, Ra 228	Water	6 months	HNO_3 to pH <2.0	1000 mL plastic bottles or 1000 mL glass bottle	1000 mL		White
Reactivity (Releasable CN and S)	Waste	14 days CN, 7 days S	4° C	(Appropriate to Sample 125 mL plastic bottle or 60 mL glass jar	10 g	SW- 846 Chapter 7	White

*Sample must also be preserved with Sodium Thiosulfate or Ascorbic Acid if chlorinated
**All low-level mercury bottles are stored filled with 5 mL of concentrated HCl and Millipore water
NOTE: For Organics parameters, container lid should be Teflon.
NOTE: For Inorganic parameters, container lid should be plastic or Teflon lined.
NOTE: When testing for several like parameters (ICP metals, Ion Chromatograph anions), one container per sample is sufficient. For example, a sample to be tested for the 13 priority pollutant metals needs one 500 mL container.

Appendix AH

TriMatrix Laboratories, Inc.

Internal Chain of Custody --- Work Order # **0703103**

Client: [redacted]
Project: [redacted]

Project Manager: **Gary L. Wood**
Date Received: **Mar-08-07 08:45**

Department: **Semivolatiles GC** Analysis: _____

Lab Number / Sample Name	*Container*	*Removed by (Signature)*	*Date & Time Removed*	*Date & Time Returned*	*Consumed?*	*Extract Container*
0703103-01 SG1 (0-2)						
0703103-02 SG2 (0-1)						
0703103-03 SG3 (0-1)						
0703103-04 SG4 (0-1)						
0703103-05 SG5 (0-1)						
0703103-06 SG6 (0-1.5)						
0703103-07 SG7 (2-4)						
0703103-08 SG8 (2-3.5)						
0703103-09 SG16 (0-2)						
0703103-10 SG32 (0-2)						
0703103-11 SG31						
0703103-12 SG30						
0703103-13 SG29						
0703103-14 SG22 (2-6)						

Client: [redacted]
Project: [redacted]

Project Manager: **Gary L. Wood**
Date Received: **Mar-08-07 08:45**

Department: **Semivolatiles GC** Analysis: _____

Lab Number / Sample Name	*Container*	*Removed by (Signature)*	*Date & Time Removed*	*Date & Time Returned*	*Consumed?*	*Extract Container*
0703103-15 SG21 (0-2)						
0703103-16 SG20 (0-2)						

Appendix AI

TriMatrix Laboratories, Inc.

Non-Conformance Investigation Report

Client:_____ **Project Number:**_____

Sample Number(s):_____ **Date Initiated:**_____ **Date Due:**_____

Initiated By:_____ **Document Control Number:** _____

Investigation Resulting From: ☑ Internal Observation ☐ Client Complaint ☐ Audit ☐ Failing PT Sample

I. Area of Non-Conformance:

☐ Sample Receiving / Storage ☐ Bottle Prep ☐ Client Services / Reporting ☐ Other_____

☐ Inorganic (Wet Chemistry / Metals) Laboratory ☑ Organic (Volatile / Semi-Volatile / Extraction) Laboratory

II. Description of Non-Conformance:

_____

_____

_____

_____

III. Explanation of Investigation into Non-Conformance:

_____

_____

_____

_____ Initials:_____ Date: _____

IV. Resolution:

_____

_____

_____

_____

_____ Initials:_____ Date: _____

V. Follow-Up (if required):

_____

_____

_____

_____ Initials:_____ Date: _____

VI. Reviewed By:

QA Manager:_____ **Area Manager:**_____

Date Completed:_____

Appendix AJ

TriMatrix Laboratories, Inc.

Preventive Action Investigation

Initiated By: _____ **Document Control Number:** _____

Date Initiated: _____ **Date Due:** _____

Investigation Resulting From: ☐ Internal Observation ☐ Client Complaint ☐ Audit ☐ Failing PE Sample

I. Area of Preventive Action:

☐ Sample Receiving / Storage ☐ Bottle Prep ☐ Client Services / Reporting ☐ Other_____

☐ Inorganic (Wet Chemistry / Metals) Laboratory ☐ Organic (Volatile / Semi-Volatile / Extraction) Laboratory

II. Description and Proposed Solutions:

_____

_____

_____

_____

III. Action Plan and Implementation Schedule:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ Initials:_____ Date: _____

V. Follow-Up to Monitor Effectiveness:

_____

_____

_____

_____

_____

_____ Initials:_____ Date: _____

VI. Reviewed By:

QA Manager: _____ **Area Manager:** _____

Date Completed: _____

Appendix A

TriMatrix Laboratories, Inc.

CHEMIST I

General Description

Under direct supervision of the area manager and group leader, conducts analyses on samples to determine their chemical and/or physical properties.

Educational/Background Requirements

- Associates degree and 3 or more years of experience in an environmental or related laboratory setting; or
- BS degree in Chemistry or a related field of science.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Chemist I.

- Perform analyses in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation and routine maintenance of instruments and equipment.
- Become completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent methods following the guidelines established in the test method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to analyses, including but not limited to, standard preparation logbooks, instrument run logbooks, personal notebooks, and instrument maintenance logbooks.
- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- Perform all other activities deemed necessary to management.

TriMatrix Laboratories, Inc.

CHEMIST II

General Description

Under ***general*** supervision of the area manager and group leader, conducts analyses on samples to determine their chemical and/or physical properties.

Educational/Background Requirements

- Associates degree and *5* or more years of experience in an ***applicable discipline***; or
- BS degree in Chemistry or a related field of science ***and 2 or more years of experience in an applicable discipline***; or
- ***MS degree in Chemistry or a related field of science.***

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Chemist II.

- Perform analyses in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation and routine maintenance of instruments and equipment.
- ***Remain*** completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent methods following the guidelines established in the test method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to analyses, including but not limited to, standard preparation logbooks, instrument run logbooks, personal notebooks, and instrument maintenance logbooks.
- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- ***Assist other chemists and technicians with their professional development.***

- ***Act as company advocate by setting a positive example in work habits and attitude to other staff members.***
- ***Demonstrate ability to work independently with minimal errors.***
- ***Capable of conducting peer review on routine data packages.***
- ***Possess the minimum level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements.***
- Perform all other activities deemed necessary to management.

TriMatrix Laboratories, Inc.

CHEMIST III

General Description

Under ***minimal*** supervision of the area manager and group leader, conducts analyses on samples to determine their chemical and/or physical properties. ***Eligible for consideration of group leader status.***

Educational/Background Requirements

- Associates degree and ***7 or more years of experience in an applicable discipline***; or
- BS degree in Chemistry or a related field of science and ***4*** or more years of experience in an applicable discipline; or
- MS degree in Chemistry or a related field of science ***and 2 or more years of experience in an applicable discipline.***

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Chemist III.

- Perform analyses in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation and routine/***non-routine*** maintenance ***and troubleshooting*** of instruments and equipment.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent methods following the guidelines established in the test method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to analyses, including but not limited to, standard preparation logbooks, instrument run logbooks, personal notebooks, and instrument maintenance logbooks.
- Follow all laboratory safety procedures.

- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- Assist other chemists and technicians with their professional development.
- Act as company advocate by setting a positive example in work habits and attitude to other staff members.
- Demonstrate ***increased*** ability to work independently with minimal errors.
- Capable of conducting peer review on routine ***and non-routine*** data packages. ***Has demonstrated knowledge to perform final data review and approval on LIMS.***
- Possess ***an above average*** level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements.
- ***Assist in the development and maintenance of laboratory SOPs.***
- Perform all other activities deemed necessary to management.

TriMatrix Laboratories, Inc.

CHEMIST IV

General Description

Under minimal supervision of the area manager and***/or the technical director***, conducts ***complex*** analyses on samples to determine their chemical and/or physical properties. Eligible for consideration of group leader status.

Educational/Background Requirements

- Associates degree and ***10*** or more years of experience in an applicable discipline; or
- BS degree in Chemistry or a related field of science and ***7*** or more years of experience in an applicable discipline; or
- MS degree in Chemistry or a related field of science and ***4*** or more years of experience in an applicable discipline; or
- ***Ph.D. in Chemistry or a related field of science and experience in an environmental or related laboratory setting.***

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Chemist IV.

- Perform analyses in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation ***of, and assisting other chemists in***, routine/non-routine maintenance and troubleshooting of instruments and equipment.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent methods following the guidelines established in the test method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to analyses, including but not limited to, standard preparation logbooks, instrument run logbooks, personal notebooks, and instrument maintenance logbooks.

- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- Assist other chemists and technicians with their professional development ***and in the integration of new methods and technologies***.
- Act as company advocate by setting a positive example in work habits and attitude to other staff members, ***prospective employees, existing and perspective clientele, and the general public***.
- Demonstrate ***superior*** ability to work independently with minimal errors.
- Capable of conducting peer review on routine and non-routine data packages. Has demonstrated knowledge to perform final data review and approval on LIMS.
- Possess ***a superior*** level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements.
- ***Demonstrate ability to improve productivity as shown by an increase in sample throughput, addition of new methods of analysis, and/or operation of additional instruments.***
- ***When appropriate, work with the technical director to develop new methods and technologies.***
- ***Develop, review, and update laboratory SOPs as necessary***.
- Perform all other activities deemed necessary to management.

TriMatrix Laboratories, Inc.

CHEMIST V

General Description

Under minimal supervision of the area manager and/or the technical director, conducts complex analyses on samples to determine their chemical and/or physical properties. Eligible for consideration of group leader status. ***May work directly with the technical director to develop new methods and technologies for the laboratory.***

Educational/Background Requirements

- Associates degree and ***13*** or more years of experience in an applicable discipline; or
- BS degree in Chemistry or a related field of science and ***10*** or more years of experience in an applicable discipline; or
- MS degree in Chemistry or a related field of science and ***6*** or more years of experience in an applicable discipline; or
- Ph.D. in Chemistry or a related field of science and ***2 or more years of*** experience in an environmental or related laboratory setting.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Chemist V.

- Perform analyses in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation of, assisting other chemists in, ***and serving as the primary reference for***, routine/non-routine maintenance and troubleshooting of instruments and equipment.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent methods following the guidelines established in the test method or Quality Assurance Manual.

- Maintain all applicable documentation pertinent to analyses, including but not limited to, standard preparation logbooks, instrument run logbooks, personal notebooks, and instrument maintenance logbooks.

- Follow all laboratory safety procedures.

- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.

- Assist other chemists and technicians with their professional development and in the integration of new methods and technologies.

- Act as company advocate by setting a positive example in work habits and attitude to other staff members, prospective employees, existing and perspective clientele, and the general public.

- Demonstrate superior ability to work independently with minimal errors.

- Capable of conducting peer review on routine and non-routine data packages. Has demonstrated knowledge to perform final data review and approval on LIMS.

- Possess a superior level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements.

- Demonstrate ability to improve productivity as shown by an increase in sample throughput, addition of new methods of analysis, and/or operation of additional instruments.

- ***Responsible for the study and implementation of*** new methods and technologies.

- Develop, review, and update existing laboratory SOPs as necessary, ***write new SOPs as required to reflect advancements in methods and technologies.***

- ***Work with management team to plan for future equipment acquisitions.***

- ***Provide input to area manager/technical director/laboratory president on personnel issues including performance reviews and staff additions/reductions.***

- Perform all other activities deemed necessary to management.

TriMatrix Laboratories, Inc.

SENIOR CHEMIST

General Description

Working independently or under minimal supervision of, ***an*** area manager, technical director, ***or the laboratory president***, conducts ***or supervises analysis of complex non-routine projects*** to determine their chemical and/or physical properties. Eligible for consideration of group leader status.

Educational/Background Requirements

- BS degree in Chemistry or a related field of science and ***15*** or more years of experience in an applicable discipline; or
- MS degree in Chemistry or a related field of science and ***10*** or more years of experience in an applicable discipline; or
- Ph.D. in Chemistry or a related field of science and *7* or more years of experience in an environmental or related laboratory setting.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Senior Chemist.

- Perform analyses in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation of, assisting other chemists in, and serving as the primary reference for, routine/non-routine maintenance and troubleshooting of instruments and equipment.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent methods following the guidelines established in the test method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to analyses, including but not limited to, standard preparation logbooks, instrument run logbooks, personal notebooks, and instrument maintenance logbooks.

- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- Assist other chemists and technicians with their professional development and in the integration of new methods and technologies.
- Act as company advocate by setting a positive example in work habits and attitude to other staff members, prospective employees, existing and perspective clientele, and the general public.
- Demonstrate superior ability to work independently with minimal errors.
- Capable of conducting peer review on routine and non-routine data packages. Has demonstrated knowledge to perform final data review and approval on LIMS.
- Possess a superior level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements.
- Demonstrate ability to improve productivity as shown by an increase in sample throughput, addition of new methods of analysis, and/or operation of additional instruments.
- Responsible for the study and implementation of new methods and technologies.
- Develop, review, and update existing laboratory SOPs as necessary, write new SOPs as required to reflect advancements in methods and technologies.
- Work with management team to plan for future equipment acquisitions.
- Provide input to area manager/technical director/laboratory president on personnel issues including performance reviews and staff additions/reductions.
- Perform all other activities deemed necessary to management.

TriMatrix Laboratories, Inc.

PROJECT CHEMIST I

General Description

Under direct supervision of the client services manager and project chemist group leader, acts as the primary interface with the client to assure laboratory services are meeting client needs.

Educational/Background Requirements

- Associates degree and 3 or more years of experience in an environmental or related laboratory setting; or
- BS degree in Chemistry or a related field of science.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Project Chemist I.

- Perform duties in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Prepare incoming projects for laboratory testing. Required tasks include, but are not limited to, timely submittal of properly completed bottle request forms to bottle prep, verification of the accuracy, completeness, and punctuality of filled bottle requests prior to their shipment, and timely problem solving and creation of submittals for sample delivery groups which are received to the lab.
- Become completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Review all final reports for accuracy and completeness.
- Maintain files of all applicable documentation pertinent to projects, including but not limited to, quotations, completed bottle request forms, copies of contracts / purchase orders, and all other documentation listed on the "Project File Outline".
- Follow all laboratory safety procedures.
- Prepare proposal outlines for existing clients.
- Perform all other activities deemed necessary to management.

TriMatrix Laboratories, Inc.

PROJECT CHEMIST II

General Description

Under ***general*** supervision of the client services manager and project chemist group leader, acts as the primary interface with the client to assure laboratory services are meeting client needs.

Educational/Background Requirements

- Associates degree and *5* or more years of experience in an ***applicable discipline;*** or
- BS degree in Chemistry or a related field of science ***and 2 or more years of experience in an applicable discipline;*** or
- ***MS degree in Chemistry or a related field of science.***

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Project Chemist II.

- Perform duties in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Prepare incoming projects for laboratory testing. Required tasks include, but are not limited to, timely submittal of properly completed bottle request forms to bottle prep, verification of the accuracy, completeness, and punctuality of filled bottle requests prior to their shipment, and timely problem solving and creation of submittals for sample delivery groups which are received to the lab.
- ***Remain*** completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Review all final reports for accuracy and completeness.
- Maintain files of all applicable documentation pertinent to projects, including but not limited to, quotations, completed bottle request forms, copies of contracts / purchase orders, and all other documentation listed on the "Project File Outline".
- Follow all laboratory safety procedures.
- Prepare proposal outlines for existing ***and new*** clients.

- *Assist other project chemists and technicians with their professional development.*
- *Act as a company advocate by setting a positive example in work habits and attitude to other staff members.*
- *Demonstrate ability to work independently with minimal errors.*
- *Posses the minimum level of competence in computer skills (Excel, Word, LIMS, etc.) required to carry out job requirements.*
- Perform all other activities deemed necessary to management.

TriMatrix Laboratories, Inc.

PROJECT CHEMIST III

General Description

Under ***minimal*** supervision of the client services manager and project chemist group leader, acts as the primary interface with the client to assure laboratory services are meeting client needs. ***Eligible for consideration of group leader status.***

Educational/Background Requirements

- Associates degree and *7* or more years of experience in an applicable discipline; or
- BS degree in Chemistry or a related field of science and ***4*** or more years of experience in an applicable discipline; or
- MS degree in Chemistry or a related field of science ***and 2 or more years of experience in an applicable discipline.***

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Project Chemist III.

- Perform duties in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Prepare incoming projects for laboratory testing. Required tasks include, but are not limited to, timely submittal of properly completed bottle request forms to bottle prep, verification of the accuracy, completeness, and punctuality of filled bottle requests prior to their shipment, and timely problem solving and creation of submittals for sample delivery groups which are received to the lab.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Review all final reports for accuracy and completeness. ***Assist with the preparation, archiving, and delivery of a CLP or "CLP Like" deliverables package.***
- Maintain files of all applicable documentation pertinent to projects, including but not limited to, quotations, completed bottle request forms, copies of contracts / purchase orders, and all other documentation listed on the "Project File Outline".

- Follow all laboratory safety procedures.
- ***Prepare and/or coordinate the preparation of proposals for existing and new clients under direct supervision of the client services manager, sales manager, or laboratory president.***
- Assist other project chemists and technicians with their professional development.
- Act as a company advocate by setting a positive example in work habits and attitude to other staff members.
- Demonstrate ***increased*** ability to work independently with minimal errors.
- Posses ***an above average*** level of competence in computer skills (Excel, Word, LIMS, etc.) required to carry out job requirements.
- ***Demonstrate ability to improve productivity as shown by an increase in project workload and throughput.***
- ***Provide data interpretation services to clients.***
- ***Assist in the development and maintenance of laboratory SOPs.***
- Perform all other activities deemed necessary to management.

TriMatrix Laboratories, Inc.

PROJECT CHEMIST IV

General Description

Under minimal supervision of the client services manager and/***or the sales manager,*** acts as the primary interface with the client to assure laboratory services are meeting client needs. ***May work directly with the sales manager to develop increased business from existing clients.*** Eligible for consideration of group leader status.

Educational/Background Requirements

- Associates degree and ***10*** or more years of experience in an applicable discipline; or
- BS degree in Chemistry or a related field of science and ***7*** or more years of experience in an applicable discipline; or
- MS degree in chemistry or a related field of science and ***4*** or more years of experience in an applicable discipline; or
- ***Ph.D. in Chemistry or a related field of science and experience in an environmental or related laboratory setting.***

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Project Chemist IV.

- Perform duties in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Prepare, ***and assist other project chemists with,*** incoming projects for laboratory testing. Required tasks include, but are not limited to, timely submittal of properly completed bottle request forms to bottle prep, verification of the accuracy, completeness, and punctuality of filled bottle requests prior to their shipment, and timely problem solving and creation of submittals for sample delivery groups which are received to the lab.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Review all final reports for accuracy and completeness. ***Coordinate*** the preparation, archiving, and delivery of CLP or "CLP Like" deliverables packages.

- Maintain files of all applicable documentation pertinent to projects, including but not limited to, quotations, completed bottle request forms, copies of contracts / purchase orders, and all other documentation listed on the "Project File Outline".

- Follow all laboratory safety procedures.

- Prepare and/or coordinate the preparation of proposals for existing and new clients under ***minimum*** supervision of the client services manager, sales manager, or laboratory president.

- Assist other project chemists and technicians with their professional development ***and in the integration of new methods and technologies.***

- Act as a company advocate by setting a positive example in work habits and attitude to other staff members, ***prospective employees, existing and perspective clientele, and the general public.***

- Demonstrate ***superior*** ability to work independently with minimal errors.

- Posses ***a superior*** level of competence in computer skills (Excel, Word, LIMS, etc.) required to carry out job requirements.

- Demonstrate ability to improve productivity as shown by an increase in project workload and throughput ***as well as an increased in the complexity of projects and data packages. This includes, but is not limited to, managing projects requiring a CLP or "CLP Like" deliverables package and/or managing projects to specifications outlines in QAPPs.***

- Provide data interpretation services to clients.

- ***Develop, review, and update laboratory SOPs as necessary.***

- ***When appropriate, work with sales manager to develop additional business from existing clients.***

- Perform all other activities deemed necessary to management.

TriMatrix Laboratories, Inc.

PROJECT CHEMIST V

General Description

Under minimal supervision of the client services manager and/or the sales manager, acts as the primary interface with the client to assure laboratory services are meeting client needs. ***Works*** directly with the sales manager to ***establish relationships with new clients as well as increase*** business from existing clients. Eligible for consideration of group leader status.

Educational/Background Requirements

- Associates degree and ***13*** or more years of experience in an applicable discipline; or
- BS degree in Chemistry or a related field of science and ***10*** or more years of experience in an applicable discipline; or
- MS degree in chemistry or a related field of science and ***6*** or more years of experience in an applicable discipline; or
- Ph.D. in Chemistry or a related field of science and ***2 or more years of*** experience in an environmental or related laboratory setting.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Project Chemist V.

- Perform duties in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Prepare, and assist other project chemists with, incoming projects for laboratory testing. Required tasks include, but are not limited to, timely submittal of properly completed bottle request forms to bottle prep, verification of the accuracy, completeness, and punctuality of filled bottle requests prior to their shipment, and timely problem solving and creation of submittals for sample delivery groups which are received to the lab.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Review all final reports for accuracy and completeness. Coordinate the preparation, archiving, and delivery of CLP or "CLP Like" deliverables packages.

- Maintain files of all applicable documentation pertinent to projects, including but not limited to, quotations, completed bottle request forms, copies of contracts / purchase orders, and all other documentation listed on the "Project File Outline".

- Follow all laboratory safety procedures.

- Prepare and/or coordinate the preparation of proposals for existing and new clients under minimum supervision of the client services manager, sales manager, or laboratory president. ***Take an active and substantial role on the marketing team in the development and coordination of large technical and cost proposals, qualifications packages, and marketing literature.***

- Assist other project chemists and technicians with their professional development and ***serve as the primary reference for*** the integration of new methods and technologies.

- Act as a company advocate by setting a positive example in work habits and attitude to other staff members, prospective employees, existing and perspective clientele, and the general public.

- Demonstrate superior ability to work independently with minimal errors.

- Posses a superior level of competence in computer skills (Excel, Word, LIMS, etc.) required to carry out job requirements.

- Demonstrate ability to improve productivity as shown by an increase in project workload and throughput as well as an increased in the complexity of projects and data packages. This includes, but is not limited to, managing projects requiring a CLP or "CLP Like" deliverables package and/or managing projects to specifications outlines in QAPPs. ***Improve the productivity of others through training, assistance and the development and implementation of new, more efficient procedures.***

- Provide data interpretation services to clients. ***Assist clients in developing work plans or QAPPs by providing technical and administrative laboratory documentation and/or writing the laboratory portion of QAPPs.***

- Develop, review, and update laboratory SOPs as necessary. ***Write new SOPs as required to reflect advancements in procedures or technologies.***

- ***Routinely*** work with sales manager to develop additional business from existing clients ***and new clients.***

- ***Responsible for the study and implementation of new procedures and technologies.***

- ***Work with management team to plan for future equipment and software acquisitions.***

- ***Provide input to client services manager, sales manager, and/or laboratory president on personnel issues including performance reviews and staff additions / reductions.***

- Perform all other activities deemed necessary to management.

TriMatrix Laboratories, Inc.

SENIOR PROJECT CHEMIST

General Description

Working independently or under minimal supervision of the client services manager and/or the sales manager, ***or laboratory president,*** acts as the primary interface with the client to assure laboratory services are meeting client needs. Works directly with the sales manager to establish relationships with new clients as well as increase business from existing clients. ***Works directly with the laboratory president to develop the laboratory portion of QAPPs, work plans, and other technical documents.*** Eligible for consideration of group leader status.

Educational/Background Requirements

- BS degree in Chemistry or a related field of science and ***15*** or more years of experience in an applicable discipline; or
- MS degree in chemistry or a related field of science and ***10*** or more years of experience in an applicable discipline; or
- Ph.D. in Chemistry or a related field of science and *7* or more years of experience in an environmental or related laboratory setting.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Senior Project Chemist.

- Perform duties in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Prepare, and assist other project chemists with, incoming projects for laboratory testing. Required tasks include, but are not limited to, timely submittal of properly completed bottle request forms to bottle prep, verification of the accuracy, completeness, and punctuality of filled bottle requests prior to their shipment, and timely problem solving and creation of submittals for sample delivery groups which are received to the lab.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Review all final reports for accuracy and completeness. Coordinate the preparation, archiving, and delivery of CLP or "CLP Like" deliverables packages.

- Maintain files of all applicable documentation pertinent to projects, including but not limited to, quotations, completed bottle request forms, copies of contracts / purchase orders, and all other documentation listed on the "Project File Outline".

- Follow all laboratory safety procedures.

- Prepare and/or coordinate the preparation of proposals for existing and new clients under minimum supervision of the client services manager, sales manager, or laboratory president. Take an active and substantial role on the marketing team in the development and coordination of large technical and cost proposals, qualifications packages, and marketing literature.

- Assist other project chemists and technicians with their professional development and serve as the primary reference for the integration of new methods and technologies.

- Act as a company advocate by setting a positive example in work habits and attitude to other staff members, prospective employees, existing and perspective clientele, and the general public.

- Demonstrate superior ability to work independently with minimal errors.

- Posses a superior level of competence in computer skills (Excel, Word, LIMS, etc.) required to carry out job requirements.

- Demonstrate ability to improve productivity as shown by an increase in project workload and throughput as well as an increased in the complexity of projects and data packages. This includes, but is not limited to, managing projects requiring a CLP or "CLP Like" deliverables package and/or managing projects to specifications outlines in QAPPs. Improve the productivity of others through training, assistance and the development and implementation of new, more efficient procedures.

- Provide data interpretation services to clients. Assist clients in developing work plans or QAPPs by providing technical and administrative laboratory documentation and/or writing the laboratory portion of QAPPs.

- Develop, review, and update laboratory SOPs as necessary. Write new SOPs as required to reflect advancements in procedures or technologies.

- Routinely work with sales manager to develop additional business from existing clients and new clients.

- Responsible for the study and implementation of new procedures and technologies.

- Work with management team to plan for future equipment and software acquisitions.

- Provide input to client services manager, sales manager, and/or laboratory president on personnel issues including performance reviews and staff additions / reductions.

- Perform all other activities deemed necessary to management.

TriMatrix Laboratories, Inc.

TECHNICIAN I

General Description

Under direct supervision of the area manager and group leader, performs tasks necessary for efficient operation of the laboratory.

Educational/Background Requirements

- High school diploma or equivalent.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Technician I.

- Perform tasks in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation and routine maintenance of instruments and equipment.
- Become completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent procedures following the guidelines established in the method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to procedures, including but not limited to, procedural and maintenance logbooks and personal notebooks.
- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- Perform all other activities deemed necessary to management.

TriMatrix Laboratories, Inc.

TECHNICIAN II

General Description

Under ***general*** supervision of the area manager and group leader, performs tasks necessary for efficient operation of the laboratory.

Educational/Background Requirements

- High school diploma or equivalent ***and 2 or more years of experience in an applicable discipline;*** or
- ***Associates degree and 1 or more years of experience in an applicable discipline;*** or
- ***BS degree in Chemistry or a related field of science.***

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Technician II.

- Perform tasks in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation and routine maintenance of instruments and equipment.
- ***Remain*** completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent procedures following the guidelines established in the method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to procedures, including but not limited to, procedural and maintenance logbooks and personal notebooks.
- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- ***Assist other technicians with their professional development.***

- ***Act as a company advocate by setting a positive example in work habits and attitude to other staff members.***
- ***Demonstrate ability to work independently with minimal errors.***
- ***Possess the minimum level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements.***
- Perform all other activities deemed necessary to management.

TriMatrix Laboratories, Inc.

TECHNICIAN III

General Description

Under ***minimal*** supervision of the area manager and group leader, performs tasks necessary for efficient operation of the laboratory. ***Eligible for consideration of group leader status.***

Educational/Background Requirements

- High school diploma or equivalent and ***4*** or more years of experience in an applicable discipline; or
- Associates degree and ***3*** or more years of experience in an applicable discipline; or
- BS degree in Chemistry or a related field of science ***and 2 or more years of experience in an applicable discipline.***
- ***MS degree in Chemistry or a related field of science.***

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Technician III.

- Perform tasks in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation and routine/***non-routine*** maintenance ***and troubleshooting*** of instruments and equipment.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent procedures following the guidelines established in the method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to procedures, including but not limited to, procedural and maintenance logbooks and personal notebooks.
- Follow all laboratory safety procedures.

- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- Assist other technicians with their professional development.
- Act as a company advocate by setting a positive example in work habits and attitude to other staff members.
- Demonstrate ***increased*** ability to work independently with minimal errors.
- Possess ***an above average*** level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements.
- ***Demonstrate ability to improve productivity as shown by an increase in process/data/sample throughput.***
- ***Assist in the development and maintenance of laboratory SOPs.***
- Perform all other activities deemed necessary to management.

TriMatrix Laboratories, Inc.

TECHNICIAN IV

General Description

Under minimal supervision of the area manager and***/or the technical director***, performs ***complex*** tasks necessary for efficient operation of the laboratory. Eligible for consideration of group leader status.

Educational/Background Requirements

- High school diploma or equivalent and *7* or more years of experience in an applicable discipline; or
- Associates degree and *5* or more years of experience in an applicable discipline; or
- BS degree in Chemistry or a related field of science and *4* or more years of experience in an applicable discipline; or
- MS degree in Chemistry or a related field of science ***and 2 or more years of experience in an applicable discipline.***

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Technician IV.

- Perform tasks in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation ***of, and assisting other technicians in,*** routine/non-routine maintenance and troubleshooting of instruments and equipment.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent procedures following the guidelines established in the method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to procedures, including but not limited to, procedural and maintenance logbooks and personal notebooks.
- Follow all laboratory safety procedures.

- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- Assist other technicians with their professional development ***and in the integration of new procedures and technologies.***
- Act as a company advocate by setting a positive example in work habits and attitude to other staff members, ***prospective employees, existing and prospective clientele, and the general public***.
- Demonstrate ***superior*** ability to work independently with minimal errors.
- Possess ***a superior*** level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements.
- Demonstrate ability to improve productivity as shown by an increase in process/data/sample throughput, ***addition of new procedures/technologies and/or operation of additional equipment/instruments.***
- ***When appropriate, work with the technical director, laboratory president, or sales manager to develop new procedures and technologies.***
- ***Develop, review, and update laboratory SOPs as necessary.***
- Perform all other activities deemed necessary to management.

TriMatrix Laboratories, Inc.

TECHNICIAN V

General Description

Under minimal supervision of the area manager and/or the technical director, performs complex tasks necessary for efficient operation of the laboratory. Eligible for consideration of group leader status. ***May work directly with the technical director, laboratory president, or sales manager to develop methods, procedures, and technologies for the laboratory.***

Educational/Background Requirements

- High school diploma or equivalent and ***10*** or more years of experience in an applicable discipline; or
- Associates degree and ***8*** or more years of experience in an applicable discipline; or
- BS degree in Chemistry or a related field of science and ***6*** or more years of experience in an applicable discipline; or
- MS degree in Chemistry or related field of science and ***4*** or more years of experience in an applicable discipline.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Technician V.

- Perform tasks in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation of, and assisting other technicians in, ***and serving as the primary reference for,*** routine/non-routine maintenance and troubleshooting of instruments and equipment.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent procedures following the guidelines established in the method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to procedures, including but not limited to, procedural and maintenance logbooks and personal notebooks.

- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- Assist other technicians with their professional development and in the integration of new procedures and technologies.
- Act as a company advocate by setting a positive example in work habits and attitude to other staff members, prospective employees, existing and prospective clientele, and the general public.
- Demonstrate superior ability to work independently with minimal errors.
- Possess a superior level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements.
- Demonstrate ability to improve productivity as shown by an increase in process/data/sample throughput, addition of new procedures/technologies and/or operation of additional equipment/instruments.
- ***Responsible for the study and implementation of*** new procedures and technologies.
- Develop, review, and update laboratory SOPs as necessary, ***write new SOPs as required to reflect advancement in procedures and technologies.***
- ***Work with management team to plan for future equipment acquisitions.***
- ***Provide input to area manager/technical director/laboratory president on personnel issues including performance reviews and staff additions/reductions.***
- Perform all other activities deemed necessary to management.

TriMatrix Laboratories, Inc.

SENIOR TECHNICIAN

General Description

Working independently or under minimal supervision of, ***an*** area manager, technical director, ***or the laboratory president,*** performs ***or supervises tasks related to complex non-routine projects*** necessary for efficient operation of the laboratory. Eligible for consideration of group leader status.

Educational/Background Requirements

- High school diploma or equivalent and ***15*** or more years of experience in an applicable discipline; or
- Associates degree and ***13*** or more years of experience in an applicable discipline; or
- BS degree in Chemistry or a related field of science and ***10*** or more years of experience in an applicable discipline; or
- MS degree in Chemistry or related field of science and *7* or more years of experience in an applicable discipline.

Minimum Required Skills and Responsibilities

The following are the minimum skills and responsibilities required of a Senior Technician.

- Perform tasks in an ethical and acceptable manner, as outlined in the TriMatrix Laboratory Code of Ethics, and each applicable Standard Operating Procedure (SOP).
- Responsible for the daily operation of, and assisting other technicians in, and serving as the primary reference for, routine/non-routine maintenance and troubleshooting of instruments and equipment.
- Remain completely familiar with all aspects of the laboratory Quality Assurance Manual. Perform all QA/QC procedures outlined in the laboratory Quality Assurance Manual and the laboratory specific SOPs.
- Perform Demonstration of Capabilities (DOC) for all pertinent procedures following the guidelines established in the method or Quality Assurance Manual.
- Maintain all applicable documentation pertinent to procedures, including but not limited to, procedural and maintenance logbooks and personal notebooks.

- Follow all laboratory safety procedures.
- Maintain adequate supply of all spare parts and consumable supplies to ensure efficient, uninterrupted operation of the laboratory area.
- Assist other technicians with their professional development and in the integration of new procedures and technologies.
- Act as a company advocate by setting a positive example in work habits and attitude to other staff members, prospective employees, existing and prospective clientele, and the general public.
- Demonstrate superior ability to work independently with minimal errors.
- Possess a superior level of competence in computer skills (Excel, Word, instrument software, LIMS, etc.) required to carry out job requirements.
- Demonstrate ability to improve productivity as shown by an increase in process/data/sample throughput, addition of new procedures/technologies and/or operation of additional equipment/instruments.
- Responsible for the study and implementation of new procedures and technologies.
- Develop, review, and update laboratory SOPs as necessary, write new SOPs as required to reflect advancement in procedures and technologies.
- Work with management team to plan for future equipment acquisitions.
- Provide input to area manager/technical director/laboratory president on personnel issues including performance reviews and staff additions/reductions.
- Perform all other activities deemed necessary to management.

TriMatrix Laboratories, Inc.

GROUP LEADER

General Description

In addition to the duties associated with the current chemist level, a group leader also takes on administrative responsibilities involved with the operation of the laboratory area.

Educational/Background Requirements

- Minimum of those specified with a Chemist III.

Minimum Required Skills and Responsibilities

Consistent with current Chemist Level, with additional or increased emphasis on the following requirements.

- Act as the area manager when the area manager is absent, filling such duties as supervision of employees and review and approval of data.
- Act as an additional source of information for management and others regarding laboratory area analysis capabilities.
- Responsible for the scheduling of work and the monitoring of workload for such items as hold times and due dates.
- Provide leadership, guidance, and training to other laboratory personnel on methods, equipment, and quality control.
- Develop, review and update laboratory SOPs as necessary.
- Assure that new methods, policies, and procedures are integrated into the laboratory area.
- Assume a primary responsibility for verifying that sample analyses are adhering to all method and laboratory specified quality assurance parameters.

Appendix B

TriMatrix Laboratories, Inc.

Inorganic Analyses

Parameter	Reference Citation
ACIDITY AS $CaCO_3$	SDM 2310 B
ALKALINITY, BICARBONATE	USEPA-310.1, SDM 2320 B
ALKALINITY, CARBONATE	USEPA-310.1, SDM 2320 B
ALKALINITY, HYDROXIDE	USEPA-310.1, SDM 2320 B
ALKALINITY, PHENOLPHTHALEIN	SDM 2320 B
ALKALINITY, TOTAL	USEPA-310.1/SDM 2320 B
BOD, (5-DAY)	SDM 5210 B
BOD, (5-DAY), DISSOLVED	SDM 5210 B
BOD, CARBONACEOUS (5-DAY)	SDM 5210 B
BROMIDE	USEPA-9056, ASTM D1246-88
CARBON DIOXIDE	SDM 4500-CO_2 C
CARBON, DISSOLVED ORGANIC	USEPA-415.1/9060, SDM 5310 D
CARBON, PURGEABLE ORGANIC	USEPA-415.1/9060
CARBON, TOTAL INORGANIC	USEPA-415.1/9060
CARBON, TOTAL ORGANIC	USEPA-415.1/9060, MSA 29.3.5.2, SDM 5310 D
CARBON,ORGANIC(NON-PURGE)	USEPA-415.1/9060
CATION EXCHANGE CAPACITY	USEPA-9081
CHEMICAL OXYGEN DEMAND	USEPA-410.4, SDM 5220 D
CHLORIDE	SDM 4500-Cl B, USEPA 300.0/325.2/9056
CHLORINE, TOTAL RESIDUAL	HACH-8167
CHROMIUM, HEXAVALENT	SDM 3500-Cr D/USEPA 7196A
COLIFORM, FECAL	SDM 9222 D
COLIFORM, TOTAL	SDM 9223 B
COLOR (APPARENT)	USEPA-110.2
CONDUCTIVITY @ 25*C	USEPA-120.1/9050A, SDM 2510 B
CORROSION TOWARD STEEL	USEPA-1110
CYANIDE REACTIVITY	USEPA-7.3.3.2
CYANIDE, AMENABLE	USEPA-335.1/9012A, SDM 4500-CN G
CYANIDE, FREE	USEPA 335.3/9014
CYANIDE, WEAK ACID DIS.	APHA-4500-CN I
CYANIDE,TOTAL	USEPA-335.3/335.4/9012A
DENSITY	SDM 2710 F
EXTRACTABLE ORGANIC HALIDES-EOX	USEPA-9023
FLUORIDE	USEPA-300.0/9056, SDM 4500-F C
FORMALDEHYDE	USEPA-8411
GROUNDWATER DEPTH	USGS
GROUNDWATER LEVEL	USGS
HARDNESS, TOTAL	USEPA-130.2, SDM 2340 C
HEM; OIL & GREASE	USEPA-1664/9070A/9071B
HETEROTROPHIC PLATE COUNT	SDM 9215 B
IGNITABILITY, PENSKE-MARTENS CLOSED-CUP	USEPA-1010
IGNITABILITY, SETAFLASH CLOSED-CUP	USEPA-1020A
IRON, FERRIC BY CALCULATION	SDM 3500-Fe D
IRON, FERROUS	SDM 3500-Fe D
NITROCELLULOSE	USARMY BR&D Lab
NITROGEN, AMMONIA	USEPA-350.1, SDM 4500-NH_3 G
NITROGEN, INORGANIC (NH4)	USEPA-350.1, SDM 4500-NH_3 G
NITROGEN, INORGANIC (NO3+NO2)	USEPA-353.2, SDM 4500-NO_3 F

TriMatrix Laboratories, Inc.

Inorganic Analyses

Parameter	Reference Citation
NITROGEN, INORGANIC	USEPA-350.1 + 353.2
NITROGEN, NITRATE	USEPA-300.0/353.2/9056, SDM 4500-NO_3 F
NITROGEN, NITRATE+NITRITE	USEPA-353.2, SDM 4500-NO_3 F
NITROGEN, NITRITE	USEPA-300.0/353.2/354.1/9056, SDM 4500-NO_2 B
NITROGEN, ORG. (NH4)	USEPA-350.1
NITROGEN, ORGANIC	USEPA-351.2
NITROGEN, TOTAL KJELDAHL	USEPA-351.2
ODOR	USEPA-140.1
OXYGEN, DISSOLVED	USEPA-360.1/360.2
PAINT FILTER LIQUIDS TEST	USEPA-9095
PERCENT ASH	USEPA-160.4
PERCENT MOISTURE	USEPA-160.3
PERCENT SOLIDS	USEPA-160.3
PERCENT VOLATILE SOLIDS	USEPA-160.4, SDM 2540 G
PH	USEPA-150.1/9040B/9045C
PHENOLICS, TOTAL	USEPA-420.1/B17420.2/9066
PHOSPHORUS, ORTHO	USEPA-365.2
PHOSPHORUS, REACTIVE	USEPA-365.2
PHOSPHORUS, TOTAL	USEPA-365.1, SDM 4500-P F
PHOSPHORUS, TOTAL-SOLUBLE	USEPA-365.1, SDM 4500-P F
RESIDUE, DISSOLVED @ 180C	USEPA-160.1, SDM 2540 C
RESIDUE, DISSOLVED-VOL.	USEPA-160.4
RESIDUE, SUSPENDED	USEPA-160.2, SDM 2540 D
RESIDUE, SUSPENDED-VOL.	USEPA-160.4
RESIDUE, TOTAL	USEPA-160.3, SDM 2540 B
RESIDUE, TOTAL-VOLATILE	USEPA-160.4, SDM 2540 G
SGT-HEM; NON-POLAR MATERIAL	USEPA-1664/9070A/9071B
SILICA, DISSOLVED	USEPA-370.1
SODIUM CHLORIDE	USEPA-325.2
SODIUM HEXAMETAPHOSPHATE	USEPA-365.1
SPECIFIC GRAVITY	ASTM-D 1429-79, SDM 2710 F
STATIC WATER LEVEL	USGS
SULFATE	USEPA-300.0/375.2/375.4/9056/9038, SDM 4500-SO_4 F
SULFIDE	USEPA-376.1/376.2/9034, SDM 4500-S_2 F
SULFIDE REACTIVITY	USEPA-7.3.4.2
SULFIDES, ACID VOLATILE	ET&C VOL 12
SULFITE	USEPA-377.1
SURFACTANTS, MBAS	USEPA-425.1
TEMPERATURE	USEPA-170.1
THIOCYANATE	SDM 4500-CN M
TOTAL ORGANIC HALIDES	USEPA-9020B/9023
TURBIDITY	USEPA-180.1

TriMatrix Laboratories, Inc.

Metals Analyses

Parameter	Reference Citation
ALUMINUM, ICP	USEPA-200.7/6010B
ANTIMONY, ICP	USEPA-200.7/6010B
ANTIMONY, MS	USEPA-200.8/6020
ANTIMONY, FURNACE	USEPA-204.2/7041
ARSENIC, ICP	USEPA-200.7/6010B
ARSENIC, MS	USEPA-200.8/6020
ARSENIC, FURNACE	USEPA-206.2/7060A
BARIUM, ICP	USEPA-200.7/6010B
BARIUM, MS	USEPA-200.8/6020
BERYLLIUM, ICP	USEPA-200.7/6010B
BERYLLIUM, MS	USEPA-200.8/6020
BORON, ICP	USEPA-200.7/6010B
BORON, MS	USEPA-200.8/6020
CADMIUM, ICP	USEPA-200.7/6010B
CADMIUM, MS	USEPA-200.8/6020
CADMIUM, FURNACE	USEPA-213.2/7131A
CALCIUM AS $CaCO_3$	USEPA-200.7/6010B
CALCIUM, ICP	USEPA-200.7/6010B
CHROMIUM, ICP	USEPA-200.7/6010B
CHROMIUM, MS	USEPA-200.8/6020
CHROMIUM, FURNACE	USEPA-218.2/7191
COBALT, ICP	USEPA-200.7/6010B
COBALT, MS	USEPA-200.8/6020
COPPER, ICP	USEPA-200.7/6010B
COPPER, MS	USEPA-200.8/6020
COPPER, FURNACE	USEPA-220.2/7211
HARDNESS BY CALCULATION, ICP	USEPA-200.7/6010B
IRON, ICP	USEPA-200.7/6010B
LEAD, ICP	USEPA-200.7/6010B
LEAD, MS	USEPA-200.8/6020
LEAD, FURNACE	USEPA-239.2/7421
LITHIUM, ICP	USEPA-200.7/6010B
MAGNESIUM AS $CaCO_3$, ICP	USEPA-200.7/6010B
MAGNESIUM, ICP	USEPA-200.7/6010B
MANGANESE, ICP	USEPA-200.7/6010B
MANGANESE, MS	USEPA-200.8/6020
MERCURY, COLD VAPOR	USEPA-245.1/7470A/7471A
MOLYBDENUM, ICP	USEPA-200.7/6010B
MOLYBDENUM, MS	USEPA-200.8/6020
NICKEL, ICP	USEPA-200.7/6010B
NICKEL, MS	USEPA-200.8/6020
NICKEL, FURNACE	USEPA-249.2/7521
PHOSPHORUS, ICP	USEPA-200.7/6010B
POTASSIUM, ICP	USEPA-200.7/6010B
SELENIUM, ICP	USEPA-200.7/6010B
SELENIUM, MS	USEPA-200.8/6020
SELENIUM, FURNACE	USEPA-270.2/7740
SILICON, ICP	USEPA-200.7/6010B
SILVER, ICP	USEPA-200.7/6010B

TriMatrix Laboratories, Inc.

Metals Analyses

Parameter	Reference Citation
SILVER, MS	USEPA-200.8/6020
SILVER, FURNACE	USEPA-272.2/7761
SODIUM, ICP	USEPA-200.7/6010B
STRONTIUM, DISSOLVED	USEPA-200.7/6010B
STRONTIUM, TOTAL	USEPA-200.7/6010B
THALLIUM, ICP	USEPA-200.7/6010B
THALLIUM, MS	USEPA-200.8/6020
THALLIUM, FURNACE	USEPA-279.2/7841
TIN, ICP	USEPA-200.7/6010B
TIN, MS	USEPA-200.8/6020
TITANIUM, ICP	USEPA-200.7/6010B
VANADIUM, ICP	USEPA-200.7/6010B
VANADIUM, MS	USEPA-200.8/6020
ZINC, ICP	USEPA-200.7/6010B
ZINC, MS	USEPA-200.8/6020

TriMatrix Laboratories, Inc.

Semi-Volatile Organic Analyses

Parameter	Reference Citation
HPLC ACRYLAMIDE	METHOD 21
HPLC DIMETHYLAMINE	METHOD 34
GC ORGANOCHLORINE PESTICIDES	USEPA-608/8081A
GC METHOXYCHLOR	USEPA-608.2
HPLC POLYNUCLEAR AROMATIC HYDROCARBONS	USEPA-610/8310
GC/MS BASE/NEUTRAL/ACIDS	USEPA-625/8270C
GC ANALYSIS OF 1,2-DIBROMOMETHANE/ 1,2-DIBROMO-3-CHLOROPROPANE/ 1,2,3-TRICHLOROPROPANE BY MICROEXTRACTION	USEPA-8011
GC DIESEL RANGE ORGANICS	USEPA-8015B, CALIFORNIA LUFT METHOD, WISCONSIN METHOD PUBL-SW-141
GC GLYCOLS	USEPA-8015B
GC POLYCHLORINATED BIPHENYLS	USEPA-8082
GC CHLORINATED HYDROCARBONS	USEPA-8121
GC HERBICIDES	USEPA-8151A
HPLC ALDEHYDES	USEPA-8315A
HPLC NITROAROMATICS AND NITRAMINES	USEPA-8330
HPLC NITROGLYCERINE	USEPA-8332

TriMatrix Laboratories, Inc.

Volatile Organic Analyses

Parameter	Reference Citation
GC GASOLINE RANGE ORGANICS	USEPA-8015B, CALIFORNIA DHS LUFT, IOWA-PA1, WISCONSIN METHOD PUBL-SW-140
GC AIR ANALYSIS	40CFR METHOD 18
GC DISSOLVED HEADSPACE ANALYSIS OF METHANE/ETHANE/ETHYLENE	RSK-175
GC ALCOHOLS	USEPA-8015B
GC VOLATILE ORGANICS	USEPA-502.2/524.2/601/602/8021B
GC/MS VOLATILE ORGANICS	USEPA-524.2/624/8260B

Appendix C

TriMatrix Laboratories, Inc.

Major Laboratory Instrumentation, December 2006

Manufacturer	Instrument Type	Detector	Model #	Year Purchased	Condition When Purchased	Instrument #
Agilent	GC	Quadrupole MS	5973	2005	New	224
Agilent	GC	Quadrupole MS	5973	2000	New	197
Hewlett Packard	GC	Quadrupole MS	5971	1994	New	145
Hewlett Packard	GC	Quadrupole MS	5971	1994	New	139
Hewlett Packard	GC	PID/FID	5890 Series II	1994	New	140
Hewlett Packard	GC	PID/ELCD	5890 Series II	1994	New	142
Hewlett Packard	GC	PID/ELCD	6890	2001	New	117
Hewlett Packard	GC	FID	5890	1992	New	157
Agilent	GC	ECD/ECD	6890N	2002	New	222
Agilent	GC	Quadrupole MS	5973	1999	New	195
Varian	GC	Ion Trap MS	Saturn II	1991	New	138
Hewlett Packard	GC	ECD	5890 Series II	1991	New	158
Varian	GC	FID	3400	1991	Refurbished	159
Agilent	GC	ECD/ECD	6890	2001	New	199
Hewlett Packard	GC	ECD/ECD	5890 Series II	1994	New	144
Agilent	GC	Quadrupole MS	5975B	2006	New	304
Perkin Elmer	HPLC	Fluorescence/ Diode Array	Series 200	2003	New	221
Perkin Elmer	Atomic Absorption Spectrophotometer	Atomic Absorption Furnace	4100ZL	1992	New	106
Perkin Elmer	Inductively Coupled Plasma Spectrophotometer	Quadrupole MS	ELAN 6000	1996	Used	114
Perkin Elmer	Inductively Coupled Plasma Spectrophotometer	Quadrupole MS	ELAN 6100	2001	New	201
Perkin Elmer	Inductively Coupled Plasma Spectrophotometer	----------	Optima 3000	1993	New	101
Perkin Elmer	Trace Inductively Coupled Plasma Spectrophotometer	----------	Optima 3300	1999	New	116
PS Analytical	Cold Vapor Purge and Trap	Absorption/ Fluorescence	PSA 10.035	2001	New	202
PS Analytical	Cold Vapor	Absorption	PSA 10.035	2002	New	216
Lachat	Auto-Analyzer	FIA+	8000 Series	2000	New	189
Mettler	Auto-Titrator	pH Probe	DL12	1992	New	187
Shimadzu	Spectrophotometer	UV-VIS	UV-1601	2001	New	120
O.I. Analytical	TOC Analyzer	IR	1010	2000	New	198
Thermo	TOX Analyzer	Coulometric	ECS1200	1999	New	194
O.I. Analytical	Available Cyanide	Coulometric	FS-3000	2003	New	299
Konelab	Automated Spectrophotometer	UV	20	2006	Refurbished	303
Konelab	Automated Spectrophotometer	UV	Aqua 20	2003	New	298
Orion	Dissolved Oxygen Meter	DO Probe	1113000	2006	New	305
Dionex	Ion Chromatograph	Conductivity Probe	ICS-2000	2006	New	306
YSI	Conductivity Meter	Conductivity Probe	3200	1999	New	188

Appendix D

TriMatrix Laboratories, Inc.

New Employee Orientation Checklist

Name:_____ Employee #: _____ Date of Hire: ____/____/____

I. Personnel Information Review (Human Resources Manager)

Reviewed (☑)	Item
	Employee Information Sheet Completed
	I-9 Employment Eligibility Verification Form Completed
	W-4 Forms Completed
	Employee Benefits Reviewed
	Direct Deposit Forms Initiated
	Details of Compensation Reviewed
	Key Fob to the Facility Provided (Number _____)
	Employee Handbook Distributed
	Code of Ethics / Data Integrity Policy Agreement Form Signed and Collected. Violation of Ethics Policy Explained.

Signatures below attest that all the information or items described above have been discussed/provided:

____/____/____ _____ ____/____/____ _____

Human Resources Manager Signature Employee Signature

TriMatrix Laboratories, Inc.

New Employee Orientation Checklist

II. Quality Assurance Training (Quality Assurance Officer)

Reviewed (☑)	Item
	Initial and Continuing Demonstration of Capability Requirements Reviewed
	Corrective Action (Non-Conformance) Investigation Procedure Reviewed
	Error Correction Policy Reviewed
	Code of Ethics/Data Integrity Policies Explained
	Initials Added to the Initials Logbook
	Training Forms Initiated for the Following Documents: QA Manual Corrective Action SOP, GR-10-106 or GR-03-101 or GR-03-124 Manual Integration SOP, GR-10-115 General Guidelines for Data Validation and Reporting, GR-10-103 Internal Chain-of-Custody, GR-10-104 Data Confidentiality, GR-10-118

Signatures below attest that all the information or items described above have been discussed/provided:

____/____/____ _____ ____/____/____ _____

Quality Assurance Officer Signature Employee Signature

TriMatrix Laboratories, Inc.

New Employee Orientation Checklist

III. Safety Training (Health and Safety Officer)

Reviewed (☑)	Item
	MSDS Location Discussed
	Safety Walk/Safety Equipment Review, First-Aid Cabinet Locations Identified
	Safety Exam Explained-First two of thirteen videos completed (others to be completed on own during normal working hours)
	Training Forms Initiated for the Following Documents: Chemical Hygiene Plan Safety Manual Copy Emergency Action Plan Copy
	Safety Glasses Ordered or Distributed

Signatures below attest that all the information or items described above have been discussed/provided:

____/____/____ _____
Safety Officer Signature

____/____/____ _____
Employee Signature

TriMatrix Laboratories, Inc.

New Employee Orientation Checklist

IV. General Laboratory Area Overview (Area Supervisor)

Reviewed (☑)	Item
	Primary Job Responsibilities Reviewed
	Job Levels and Requirements for Advancement Reviewed
	Introduction to Apparatus and Materials Completed
	Specific Laboratory Area Safety Issues Reviewed
	Method/SOP – Laboratory Intranet Library Directories Shown
	Instrument Manual Storage Location Shown
	Instrument Maintenance Logbook Requirements Reviewed
	Instrument Run Logbook Requirements Reviewed
	Method Detection Limit Study Requirements Reviewed
	Overview of Laboratory Area LIMS Requirements and Procedures Reviewed
	General Paperwork Flow and Benchsheet Procedures Reviewed
	QC Types / Control Windows / Qualifier Procedures Reviewed
	Data Review and Documentation Procedures Reviewed

Signatures below attest that all the information or items described above have been discussed/provided:

____/____/____ _____
Area Supervisor Signature

____/____/____ _____
Employee Signature

Appendix E

TriMatrix Laboratories, Inc.

CODE OF ETHICS / DATA INTEGRITY POLICY AGREEMENT FORM

All full time, part time, and contracted employees working for TriMatrix Laboratories, Inc. are required to make every effort to generate data of the highest quality. To ensure that the employees of TriMatrix live up to this expectation, each employee must agree to abide by the following integrity requirements:

I. All TriMatrix employees are responsible for the propriety and consequences of his or her actions.

II. All employees will conduct all aspects of company business in an ethical and legal manner, and will obey all applicable federal, state, and local laws and regulations.

III. Under no circumstances will the name of any client or any information regarding a client be revealed to another client or to a regulatory agency without that client's prior written permission.

IV. All gratuities/gifts provided by suppliers/vendors are the property of the laboratory and may not be kept for personal use.

Additionally, each employee must be aware that the following actions constitute violations of management policy and may result in immediate termination of employment with TriMatrix Laboratories, Inc.:

A. Intentionally reporting data values that are not the actual values obtained.

B. Intentionally reporting dates and/or times of sample analysis that are not the actual dates and times.

C. Intentionally representing another individual's work as one's own.

D. Intentionally omitting an accepted part of an analytical method and/or operating procedure which is known always to be included as part of the analysis. (Note: this does not include justified deviations from compendia methods.) Examples of unacceptable practices include "peak-shaving", "time-traveling", "short-cutting methods", "unscientific rounding and extrapolation of numbers to achieve a desired result".

Management must also do their part by providing the facilities, equipment, and time necessary to make quality a realistic goal. This is accomplished by providing the facilities, equipment, and time necessary to make quality a realistic goal. It also requires a conscious effort by management to insulate the staff from work-related undue pressures, which would compromise the quality of work. The source of undue pressure may be internal (e.g., management pressure, deadlines) or external (e.g., customer complaints and priority requests).

AGREEMENT STATEMENT

I have read and understood the Code of Ethics/Data Integrity Policy Agreement Form and agree to abide by the policies stated. I understand that violation of these policies may result in termination of my employment with TriMatrix Laboratories, Inc. I agree to take responsibility for my own actions, and will inform my supervisor at TriMatrix immediately, of any accidental reporting of non-authentic data by myself.

Employee (print name)	Signature	Date

Appendix F

TriMatrix Laboratories, Inc.

New Instrument Accuracy Study

Instrument Number: ______________ **Method Reference:** ______________________ **Analyst:** ______________ **Date Analyzed:** ______________

Compound	Analysis #1		Analysis #2		Analysis #3		Analysis #4		Analysis #5		Analysis #6		Analysis #7	
	Conc.:		Conc.:		Conc.:		Conc.:		Conc.:		Conc.:		Conc.:	
	Units:		Units:		Units:		Units:		Units:		Units:		Units:	
	Amount Found	Percent Recovery	Amount Found	Percent Recovery	Amount Found	Percent Recovery	Amount Found	Percent Recovery	Amount Found	Percent Recovery	Amount Found	Percent Recovery	Amount Found	Percent Recovery

TriMatrix Laboratories, Inc.

New Instrument Accuracy Study

Instrument Number: ______________ **Method Reference:** __________________________ **Analyst:** ________________ **Date Analyzed:** __________

Compound	Standard Deviation of Percent Recoveries	Standard Deviation Window	Pass/ Fail Standard Deviation	Average Percent Recovery	Percent Recovery Window	Pass/ Fail Percent Recovery	Overall Pass/ Fail

Appendix G

TriMatrix Laboratories, Inc.

New Instrument Information and Initial Demonstration of Capability

Item:		**Serial Number:**	
Manufacturer:		**Date Received:**	
Model:		**Location:**	

Initial Demonstration of Capability Passed: Yes / No / NA

Date Initial Demonstration of Capability Completed: _____

Initial Demonstration of Capability Data Attached: Yes / No / NA

Adequate Sensitivity Achieved (LFB or MDL Completed): Yes / No / NA

LFB or MDL Documentation Attached: Yes / No / NA

Date LFB or MDL Completed: _____

Linear Range Developed and Demonstrated Yes / No / NA

Linear Range Development Information Attached: Yes / No / NA

Notes: _____

Approvals and Assigned Instrument Number

_____ _____

Quality Assurance Manager **Laboratory Area Manager**

TriMatrix Instrument Number: _____ **Date In Service:** _____

Appendix H

TriMatrix Laboratories, Inc.

********** LABORATORY
DEMONSTRATION OF CAPABILITY FOR **********

Parameter	Date Analyzed	Method	Inst. Number	Units	Amount Spiked	Cert. #1 Amount Found	Cert. #2 Amount Found	Cert. #3 Amount Found	Cert. #4 Amount Found	Average Percent Recovery	Percent Recovery Window	Pass/Fail Percent Recovery	Percent RSD	Percent RSD Window	Percent RSD Pass/Fail	Overall Pass/ Fail

Appendix I

TriMatrix Laboratories, Inc.

INORGANIC LABORATORY
DEMONSTRATION OF CAPABILITY

Parameter: Percent Solids

Method: SW-846 3550B/GR-07-115

Trainer: John Doe

Trainee: John Smith

Analyst	Date	Run #1	Run #2	Run #3	Run #4	Units	Inst. #	Standard Deviation	Average	Degrees of Freedom D	Experimental Student's t Value	Tabular Student's t Value	Are the Two Sets of Results Statistically the Same AND RSDs<20?
John Doe	#######	48.3	55.6	44.2	47.5	%	117	4.81	48.9	5.48	0.227	4.032	YES(PASS)
John Smith	#######	45.9	50.2	52.1	44.7	%	117	3.50	48.2				

Appendix J

TriMatrix Laboratories, Inc.

NELAC Demonstration of Capability Certification Statement

Employee Name:_____ **Date:**_____

Method Name(s), Number(s), and Revision(s):

_____

_____

_____

Matrix:_____ **Analyte(s) or Parameter(s):**_____

SOP Number:_____ **Revision Number:**_____

We, the undersigned, CERTIFY that:

Yes / NA

☐☐ 1. The analyst identified above, using the cited test method(s), which is in use at this facility for the analyses of samples under the National Environmental Laboratory Accreditation Program, have met the Demonstration of Capability.

☐☐ 2. The test method(s) was performed by the analyst identified on this certification.

☐☐ 3. A copy of the test method(s) and the laboratory-specific SOPs are available for all personnel on-site.

☐☐ 4. The data associated with the demonstration capability are true, accurate, complete and self-explanatory.

With *true* meaning consistent with supporting data; *accurate* meaning based on good laboratory practices consistent with sound scientific principles/practices; *complete* meaning includes the results of all supporting performance testing; and *self explanatory* meaning data properly labeled and stored so that the results are clear and require no additional explanation.

☐☐ 5. All raw data (including a copy of this certification form) necessary to reconstruct and validate these analyses have been retained at the facility, and that the associated information is well organized and available for review by authorized assessors.

This certification form must be completed each time an Initial Demonstration of Capability study is performed, or when a Continuing Demonstration of Capability study is performed in conjunction with a revised SOP.

_____ _____

Area Supervisor Date

_____ _____

Quality Assurance Department Date

Appendix K

TriMatrix Laboratories, Inc.

LABORATORY TRAINING CHECKLIST

Employee Name: _____

Instructor Name: _____

Method Number(s) and Revision(s): _____

SOP Name, Number, and Revision: _____

Applicable Matrices: _____

n/a	Trainer/Trainee Initials	CheckPoint Item
❑		1) The employee has read the method and the standard operating procedure.
❑		2) The instructor has reviewed the method and the procedure with the employee.
❑		3) The instructor has performed a manual demonstration of the procedure.
❑		4) The employee has correctly performed the procedure under direct supervision.
❑		5) The employee has correctly performed the procedure without direct supervision.
❑		6) The employee has successfully and exclusively completed an Initial Demonstration of Capability (IDC).
❑		7) The DoC spreadsheet has been completed. The spreadsheet and all supporting analytical data have been attached.
❑		8) If applicable, or a MDL study does not yet exist, the employee has successfully completed a MDL study for all applicable matrixes.
❑		9) The MDL study spreadsheet has been completed. The spreadsheet and all supporting analytical data have been attached.
❑		10) The employee has been instructed in the QA/QC requirements of this procedure.
❑		11) The employee has been instructed in the proper procedure governing paperflow, benchsheet completion, and other relevant documentation requirements.
❑		12) NELAC Demonstration of Capability Certification Statement is Attached.

The required CheckPoints have been successfully completed, and in my opinion this employee has been adequately trained to correctly perform this procedure.

Instructor: _____ **Date:** _____

I have read and understand the SOP, understand what is required, and agree to follow it as instructed. I understand that I may not deviate from the SOP without prior approval from management.

Employee: _____ **Date:** _____

Appendix L

This Page For Lab Use Only

TriMatrix Laboratories, Inc.

This Page For Lab Use Only

INORGANIC/METALS/SEMI-VOLATILE/VOLATILE LABORATORY
2007 WATER/SOIL
METHOD DETECTION LIMIT STUDY

Parameter / Compound	Instrument Number	Reference Citation	Date Analyzed	Analyst Initials	Amount Spiked	Units	Rep. #1 Amount Found	Rep. #1 % Rec.	Rep. #2 Amount Found	Rep. #2 % Rec.	Rep. #3 Amount Found	Rep. #3 % Rec.	Rep. #4 Amount Found	Rep. #4 % Rec.	Rep. #5 Amount Found	Rep. #5 % Rec.	Rep. #6 Amount Found	Rep. #6 % Rec.	Rep. #7 Amount Found	Rep. #7 % Rec.

file: MDL 2007

revision: 2007.00

INORGANIC/METALS/SEMI-VOLATILE/VOLATILE LABORATORY
2007 WATER/SOIL
METHOD DETECTION LIMIT STUDY

Parameter / Compound	Average Amount Found	Average % Recovery	Standard Deviation	MDL	Amount Spiked	MDL Window	Pass / Fail	Average % Recovery Check	Minimum Report Limit
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		
							Missing Parameter / Compound		

TriMatrix Laboratories, Inc.

INORGANIC/METALS/SEMI-VOLATILE/VOLATILE LABORATORY
2007 WATER/SOIL
METHOD DETECTION LIMIT VERIFICATION STUDY

Parameter / Compound	Instrument Number	Reference Citation	MDL Result	Units	Date	Analyst	Verification Concentration	MDL/MDL Verification Concentration Difference	MPB Result	MDL Verification Result	MPB/MDL Verification Response Increase	Acceptable (≥3x MPB Response)?

TriMatrix Laboratories, Inc.

INORGANIC/METALS/SEMI-VOLATILE/VOLATILE LABORATORY
2007 WATER/SOIL
METHOD DETECTION LIMIT STUDY

Parameter / Compound	Instrument Number	Reference Citation	Date Analyzed	Amount Spiked	Units	Rep. #1 Amount Found	Rep. #2 Amount Found	Rep. #3 Amount Found	Rep. #4 Amount Found	Rep. #5 Amount Found	Rep. #6 Amount Found	Rep. #7 Amount Found	Average Amount Found	Average % Recovery	Standard Deviation	MDL

file: MDL 2007

revision: 2007.00

Appendix M

TriMatrix Laboratories, Inc.

SOP MAJOR REVISION
LABORATORY TRAINING CHECKLIST

Employee Name: _____

Method Number(s) and Revision(s): _____

SOP Name, Number, and Revision: _____

Applicable Matrices: _____

n/a	Employee Initials	CheckPoint Item
❑		1) I have read the updated method and/or the revised Standard Operating Procedure.
❑		2) I have successfully completed an Initial Demonstration of Capability (IDC).
❑		3) The DoC spreadsheet has been completed. The spreadsheet and all supporting analytical data have been attached.
❑		4) If applicable, or a MDL study does not yet exist, I have successfully completed a MDL study for all applicable matrixes.
❑		5) The MDL study spreadsheet has been completed. The spreadsheet and all supporting analytical data have been attached.
❑		6) I have been instructed in any new QA/QC requirements of this procedure.
❑		7) NELAC Demonstration of Capability Certification Statement is Attached.

The required CheckPoints have been successfully completed.

Date: _____ **Quality Assurance:** _____

I have read and understand the revised SOP, understand what is required, and agree to follow it as instructed. I understand that I may not deviate from the SOP without prior approval from management.

Date: _____ **Employee Signature:** _____

TriMatrix Laboratories, Inc.

SOP MINOR REVISION
LABORATORY TRAINING CHECKLIST

Employee Name: _____

Method Number(s) and Revision(s): _____

SOP Name, Number, and Revision: _____

Applicable Matrices: _____

n/a	Employee Initials	CheckPoint Item
☐		1) I have read and understood the updated method and/or the revised Standard Operating Procedure.
☐		2) I have read and understood any new QA/QC requirements of this procedure.
☐		3) NELAC Demonstration of Capability Certification Statement is Attached.

I have read and understand the revised SOP, understand what is required, and agree to follow it as instructed. I understand that I may not deviate from the SOP without prior approval from management.

Date: _____ **Employee Signature:** _____

The SOP revision has been successfully implemented.

Date: _____ **QA/QC Signature:** _____

Appendix N

TriMatrix Laboratories, Inc.

Container Packing List

For any questions regarding these containers, contact a Project Chemist at (616) 975-4500

Client: Project:

#	Sets	Sample Locations	Sample Container Types and Quantities Requested																										
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1																													
2																													
3																													
4																													
5																													
6																													
7																													
8																													
9																													
10																													
11																													
12																													
13																													
14																													
15																													
16																													
17																													
18																													
19																													
20																													
Total Containers																													

This container type requires field-filtering

MATRIX	#	TEST	SIZE (mL) / TYPE CONTAINER	OPTIONS	PRESERVATIVE	TAG COLOR
WATER	0	Unpreserved Purgeable Organics	40 mL Clear Glass Vial	40	Cool to 4° C	Yellow & Black Stripe
	1	Preserved Purgeable Organics	40 mL Clear Glass Vial (pre-preserved)	40	HCl; Cool to 4° C	Yellow
	2	Non-Purgeable Organics	1000 mL Amber Glass	1000	Cool to 4° C	Salmon
	3	General Short Hold	Plastic	125, 250, 500, 1000	Cool to 4° C	Green
	4	Nutrients	Plastic	125, 250, 500, 1000	pH <2 w/ H_2SO_4	Dark Blue
	5	Cyanides	500 mL Amber Plastic	500	pH >12 w/ NaOH	Light Blue
	6	Total Metals	Plastic	125, 250, 500, 1000	pH <2 w/ HNO_3	Red
	7	Oil & Grease/TPH	Clear Glass	1000WM, 1000NM	pH <2 w/ H_2SO_4	Dark Blue
	8	Bacteria	125 mL Plastic (pre-preserved)	125	$Na_2S_2O_3$; Cool to 4° C	Pre-Labeled (White)
	9	Sulfide	500 mL Amber Glass + NaOH ampule	500	Zinc Acetate at Lab; NaOH in Field	Light Green
	10	TOX	250 mL Amber Glass **w/ Septa Lid**	250	pH <2 w/ H_2SO_4	Lilac
	11	TOC	40 mL Amber Vial	40	pH <2 w/ H_2SO_4	Pink
	12	DRO	1000 mL Amber Glass	1000	pH <2 w/ HCl	Gray
	13	Phenols	500 mL Amber Glass	500	pH <2 w/ H_2SO_4	Brown
	14	Formaldehyde	250 mL Amber Glass	250	Cool to 4° C	Orange
	15	Dissolved Metals	Plastic	125, 250, 500, 1000	pH <2 w/ HNO_3	Red & White Stripe
SOIL	16	Inorganics/Metals	WM Plastic	125, 250, 500, 1000	Cool to 4° C	White
	17	Non Purgeable Organics	WM Clear Glass	125, 250, 500, 1000	Cool to 4° C	Manila
	18	Purgeable Organics - Bulk	60 mL WM Clear Glass	60	Cool to 4° C	Light Yellow
	19	TCLP Volatiles	125 mL Clear Glass Vial	125	Cool to 4° C	Yellow & Black Stripe
	20	% Solids	125 mL WM Plastic	125	Cool to 4° C	Yellow & White Stripe
	21	Purgeable Organics	Encore Sampler	5g, 25g	Cool to 4° C	Label on Bag
	22	Purgeable Organics - PrePres	40 mL Pre-Tared Clear Glass Vial + 10 mL MeOH ampule	40	MeOH in field; Cool to 4° C	Pre-Labeled (Light Yellow added at Lab)
MISC	23					
	24					
	25	Pesticide WWs by Method 608	1000 mL Amber Glass	1000	pH 5-9; Cool to 4° C	Yellow & White Stripe
	26	Drinking Water Volatiles	40 mL Clear Glass Vial	40	Ascorbic Acid at Lab; HCl in Field	Yellow

Notes:

DI Water for Equipment Blanks	Container Type and Size	Qty
VOC Free		
Millipore		
ASTM Metals Free		

TriMatrix Laboratories, Inc.

Project Chemist Initials	Added to Calendar & Folders (initials/date)	Revision:	Revised By/Date:

Client: _____ Project Manager: _____

Project: _____ Contact: _____

TriMatrix Project No: _____ Date of Request: _____

Type of Order: ○ One-Time ⟹ Due to Client: _____ ○ AM ◉ PM

or

◉ Calendar ⟹ Frequency: ○ Weekly ○ Semi-Annually ○ Monthly ○ Annually ○ Quarterly ◉ Daily

Prepare Containers For:

Months	☐ Jan	☐ Feb	☐ Mar	☐ Apr	☐ May	☐ Jun
	☐ Jul	☐ Aug	☐ Sep	☐ Oct	☐ Nov	☐ Dec
Weeks	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	
Days	☐ M	☐ T	☐ W	☐ TH	☐ F	

Containers will be ◉ Picked Up or ○ Shipped via: ○ First Overnight ◉ Standard Overnight

Pick up/Ship Date: _____ ○ Priority Overnight ○ Express Saver

Ship Containers to: ○ 2-Day ○ Ground

_____ ○ Saturday Delivery ○ TriMatrix Courier

_____ ○ Other: _____

_____ ☐ Shipment to be billed to FedEx Account No.:

Telephone No: _____

Shipment to include: ☐ COCs (Qty) _____ ☐ Custody Seals ☐ Temperature Blanks

☐ MSDS Sheets for all preservatives used ☐ WB TM#? ○ Y ◉ N

Comments: ☐ Cooler Banding Required

_____

_____

_____

Assembled by/Date:	Checked by/Date:	Shipped by/Date:

Cooler Number(s) Used:	Coolers Sealed With Tape	Coolers Sealed With Banding Strap	Tracking Number Label(s):
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	

Appendix O

Sample Receipt Record

TriMatrix Laboratories, Inc.

Date: _____

Page/ Line Number	Client	Quantity of Coolers OR TriMatrix Cooler Number	Arrived in Laboratory					Submittal Number (Project Chemist)	Folder Prepared (Log-In ✓)
			Time	AM	PM	Received By	Delivery Method Letter		
50-22									
50-23									
50-24									
50-25									
50-26									
50-27									
50-28									
50-29									
50-30									
50-31									
50-32									
50-33									
50-34									
50-35									
50-36									
50-37									
50-38									
50-39									
50-40									
50-41									
50-42									
50-43									
50-44									
50-45									

Number of coolers received vs. unpacked, checked by/date: _____

Folder prepared for each line, checked by/date: _____

Appendix P

TriMatrix Laboratories, Inc.

SAMPLE RECEIVING / LOG-IN CHECKLIST

Client	Project-Submittal No. new / add to
Receipt Record Page/Line No.	Project Chemist / Sample Nos.

Coolers Received

Recorded by (initials/date)

☐ Cooler ☐ Box ☐ Other_____ | Qty Received

Thermometer Used: ☐ IR Gun (#94) ☐ Digital Thermometer (#54) ☐ Other (#_____) | ☐ See Additional Cooler Information Form

Cooler No.	Time	Cooler No.	Time	Cooler No.	Time	Cooler No.	Time

Custody Seals
- ☐ none
- ☐ present / intact
- ☐ present / not intact

Coolant Location: Dispersed / Top / Middle / Bottom

Coolant/Temperature Taken Via:
- ☐ loose ice / avg 2-3 containers
- ☐ bagged ice / avg 2-3 containers
- ☐ blue ice / avg 2-3 containers
- ■ none / avg 2-3 containers

Alternate Temperature Taken Via:
- ☐ temperature blank (tb)
- ☐ 1 container

Recorded °C	Correction Factor °C	Actual °C
tb		
tb location: representative / in ice		
1		
2		
3		
	Average °C	

- ☐ Cooler ID on COC?
- ☐ VOC trip blank received?

If any shaded areas checked, complete Sample Receiving Non-Conformance Form

Paperwork Received

☐ No COC received

N/A	Yes	No	
	☐	☐	**Chain of Custody Record(s)?**
	☐		If **No**, COC initiated by _____
	☐		Rec'd for Lab signed/date/time?
☐	☐		Shipping Document?
☐	☐		Other _____

COC ID Nos.

☐ TriMatrix

☐ Other (name or ID#)_____

Check COC for Accuracy

☐ No analysis requested

Yes	No	
☐	■	Sample ID matches COC?
☐	■	Sample date and time matches COC?
☐		Container type completed on COC?
☐	■	All container types indicated are received?

Sample Condition Summary

☐ Non-TriMatrix containers, see Notes

N/A	Yes	No	
	■	☐	Broken containers/lids?
	■	☐	Missing or incomplete labels?
	■	☐	Illegible information on labels?
	■	☐	Low volume received?
	■	☐	Inappropriate containers received?
☐	■	☐	VOC vials have headspace?
☐	■	☐	Extra sample locations / containers not listed on COC?

Check Sample Preservation

N/A	Yes	No	
	☐	■	Average sample temperature ≤6° C?
☐	☐		Completed Sample Preservation Verification Form?
☐	☐	■	Samples preserved correctly?
☐	☐		If "No", added orange tag?
☐	☐		Received pre-preserved VOC soils?

☐ MeOH ☐ Na_2SO_4

Check for Short Hold-Time Prep/Analyses

- ☐ Bacteriological
- ☐ Air Bags
- ☐ EnCores / Methanol Pre-Preserved
- ☐ Formaldehyde/Aldehyde
- ☐ Green-tagged Containers
- ☐ Yellow/White-tagged 1L Ambers (SV Prep-Lab)

AFTER HOURS ONLY:
COPIES OF COC TO LAB AREA(S)
- ☐ NONE RECEIVED
- ☐ RECEIVED, COCs TO LAB(S)

Notes

- ☐ Trip blank received ☐ Trip blank not listed on COC
- ☐ No COC received, Proj. Chemist reviewed (init /date) _____
- ☐ No analysis requested, Proj. Chemist completed (init./date) _____

Cooler Received (Date/Time)	Paperwork Delivered (Date/Time)	≤1 Hour Goal Met?
		Yes / No

TriMatrix Laboratories, Inc.

SAMPLE RECEIVING / LOG-IN CHECKLIST - page 2

Project Chemist Use

Notify Laboratory Personnel of Short Hold-Times and/or Rush Work ☐ NONE

(Lab personnel notified/date)

- ☐ Inorganics _____
- ☐ Microbiology (bacteria) _____
- ☐ Metals Prep _____
- ☐ Metals _____
- ☐ GC-Volatiles _____
- ☐ MS-Volatiles _____
- ☐ Semi-Vol. Prep _____
- ☐ GC-Semi-Volatiles _____
- ☐ MS-Semi-Volatiles _____

Log-In Priority ☐ RUSH ☐ Standard

Project Chemist Notes to Log-In Personnel

Trip Blank: ☐ Log-in ☐ Do not log-in

☐ Prep Storage Blank for Client (VOCs)

☐ Sub-Contracting required ☐ Coolant required

☐ Non-TriMatrix or non-standard container type(s) received
Check pH of container type _____
Expected pH:_____ ☐ Adjust if needed

☐ Adjust pH of orange-tagged containers

☐ Lab-filter samples and document on Preservation Form

Sample Narratives to be added at Log-in

Log-In Use

Log Samples into LIMS Sample Nos.

N/A	Yes	
	☐	Receive samples in LIMS
	☐	Date/Time received entered in LIMS match COC
	☐	Read project and submittal narratives
☐	☐	Enter VOC rack/tray number into submittal narrative
	☐	Enter sample information into LIMS
☐	☐	Add any sample narratives
☐	☐	If non-conformance issues, add sample qualifiers
	☐	Print sample number labels

Log-in Analyst (initials/date/time)

Label Sample containers

N/A	Yes	No	
	☐	☐	LIMS label matches tag?
☐	☐		DISCREPANCIES CORRECTED IN LIMS
			Initials/Date: _____
☐	☐		Applicable stickers applied to labels?
		☐	MS/MSD sample
		☐	Composite before analysis
☐	☐		Applicable stickers applied to containers?
		☐	Waste sample
		☐	PT sample
		☐	USDA regulated
	☐	☐	Orange-tagged containers present?
☐	☐	☐	Adjust pH per Project Chemist
☐	☐		Initials and Date/Time Adjusted on orange tag?
☐	☐		Initials and Date/Time Adjusted on Preservation Form?

Verify Label Accuracy

	☐	Second analyst checked labels for accuracy?
☐	☐	Verify that Orange-tagged containers adjusted/initialed?

Labeled by (initials/date)	Verified by (initials/date)

Sample Storage Check all that apply

bacteria	☐ bacteria refrigerator
non-volatiles	☐ walk-in cooler
volatiles	☐ volatile lab refrigerator
waste	☐ waste cabinet
waste VOCs	☐ log-in hood refrigerator
low-level Hg	☐ metals lab - DO NOT STORE IN WALK-IN

Paperwork

N/A	Yes	
	☐	original COC (white)
	☐	copy of COC (yellow)
	☐	receiving/log-in checklist
☐	☐	additional cooler information form
☐	☐	sample preservation verification
☐	☐	sample receiving non-conformance form
☐	☐	shipping documents
☐	☐	custody seals
	☐	arrival log
☐	☐	other (note)

Appendix Q

TriMatrix
Laboratories, Inc.

SAMPLE RECEIVING / LOG-IN CHECKLIST
ADDITIONAL COOLER INFORMATION

Recorded by (initials/date)	Client		Project-Submittal No.
	Receipt Log No.	Sample Nos.	Project Chemist

Cooler No.	Time

Custody Seals
☐ none
☐ present / intact
☐ present / not intact
Coolant Location:
Dispersed / Top / Middle / Bottom
Coolant/Temperature Taken Via:
☐ loose ice / avg 2-3 containers
☐ bagged ice / avg 2-3 containers
☐ blue ice / avg 2-3 containers
☐ none / avg 2-3 containers
Alternate Temperature Taken Via:
☐ temperature blank (tb)
☐ 1 container

Recorded °C	Correction Factor °C	Actual °C
tb		
tb location: representative / in ice		
1		
2		
3		
	Average °C	

☐ Cooler ID on COC?
☐ VOC trip blank received?

Cooler No.	Time

Custody Seals
☐ none
☐ present / intact
☐ present / not intact
Coolant Location:
Dispersed / Top / Middle / Bottom
Coolant / Temperature Taken Via:
☐ loose ice / avg 2-3 containers
☐ bagged ice / avg 2-3 containers
☐ blue ice / avg 2-3 containers
☐ none / avg 2-3 containers
Alternate Temperature Taken Via:
☐ temperature blank (tb)
☐ 1 container

Recorded °C	Correction Factor °C	Actual °C
tb		
tb location: representative / in ice		
1		
2		
3		
	Average °C	

☐ Cooler ID on COC?
☐ VOC trip blank received?

Cooler No.	Time

Custody Seals
☐ none
☐ present / intact
☐ present / not intact
Coolant Location:
Dispersed / Top / Middle / Bottom
Coolant / Temperature Taken Via:
☐ loose ice / avg 2-3 containers
☐ bagged ice / avg 2-3 containers
☐ blue ice / avg 2-3 containers
☐ none / avg 2-3 containers
Alternate Temperature Taken Via:
☐ temperature blank (tb)
☐ 1 container

Recorded °C	Correction Factor °C	Actual °C
tb		
tb location: representative / in ice		
1		
2		
3		
	Average °C	

☐ Cooler ID on COC?
☐ VOC trip blank received?

Cooler No.	Time

Custody Seals
☐ none
☐ present / intact
☐ present / not intact
Coolant Location:
Dispersed / Top / Middle / Bottom
Coolant / Temperature Taken Via:
☐ loose ice / avg 2-3 containers
☐ bagged ice / avg 2-3 containers
☐ blue ice / avg 2-3 containers
☐ none / avg 2-3 containers
Alternate Temperature Taken Via:
☐ temperature blank (tb)
☐ 1 container

Recorded °C	Correction Factor °C	Actual °C
tb		
tb location: representative / in ice		
1		
2		
3		
	Average °C	

☐ Cooler ID on COC?
☐ VOC trip blank received?

Cooler No.	Time

Custody Seals
☐ none
☐ present / intact
☐ present / not intact
Coolant Location:
Dispersed / Top / Middle / Bottom
Coolant/Temperature Taken Via:
☐ loose ice / avg 2-3 containers
☐ bagged ice / avg 2-3 containers
☐ blue ice / avg 2-3 containers
☐ none / avg 2-3 containers
Alternate Temperature Taken Via:
☐ temperature blank (tb)
☐ 1 container

Recorded °C	Correction Factor °C	Actual °C
tb		
tb location: representative / in ice		
1		
2		
3		
	Average °C	

☐ Cooler ID on COC?
☐ VOC trip blank received?

Cooler No.	Time

Custody Seals
☐ none
☐ present / intact
☐ present / not intact
Coolant Location:
Dispersed / Top / Middle / Bottom
Coolant / Temperature Taken Via:
☐ loose ice / avg 2-3 containers
☐ bagged ice / avg 2-3 containers
☐ blue ice / avg 2-3 containers
☐ none / avg 2-3 containers
Alternate Temperature Taken Via:
☐ temperature blank (tb)
☐ 1 container

Recorded °C	Correction Factor °C	Actual °C
tb		
tb location: representative / in ice		
1		
2		
3		
	Average °C	

☐ Cooler ID on COC?
☐ VOC trip blank received?

Cooler No.	Time

Custody Seals
☐ none
☐ present / intact
☐ present / not intact
Coolant Location:
Dispersed / Top / Middle / Bottom
Coolant / Temperature Taken Via:
☐ loose ice / avg 2-3 containers
☐ bagged ice / avg 2-3 containers
☐ blue ice / avg 2-3 containers
☐ none / avg 2-3 containers
Alternate Temperature Taken Via:
☐ temperature blank (tb)
☐ 1 container

Recorded °C	Correction Factor °C	Actual °C
tb		
tb location: representative / in ice		
1		
2		
3		
	Average °C	

☐ Cooler ID on COC?
☐ VOC trip blank received?

Cooler No.	Time

Custody Seals
☐ none
☐ present / intact
☐ present / not intact
Coolant Location:
Dispersed / Top / Middle / Bottom
Coolant / Temperature Taken Via:
☐ loose ice / avg 2-3 containers
☐ bagged ice / avg 2-3 containers
☐ blue ice / avg 2-3 containers
☐ none / avg 2-3 containers
Alternate Temperature Taken Via:
☐ temperature blank (tb)
☐ 1 container

Recorded °C	Correction Factor °C	Actual °C
tb		
tb location: representative / in ice		
1		
2		
3		
	Average °C	

☐ Cooler ID on COC?
☐ VOC trip blank received?

Comments

Appendix R

TriMatrix Laboratories, Inc.

SAMPLE PRESERVATION VERIFICATION FORM

page ___ of ___

Client		Project-Submittal No.
Receipt Log No.	Completed By (initials/date)	Project Chemist

COC ID No.			Adjusted by:_____ Date:_____		DO NOT ADJUST pH FOR THESE CONTAINER TYPES			
Container Type	5	4	13		3	6	15	
Tag Color	Lt. Blue	Blue	Brown		Green	Red	Red Stripe	
Preservative	NaOH	H_2SO_4	H_2SO_4		None	HNO_3	HNO_3	
Expected pH	>12	<2	<2		~7	<2	<2	
COC Line No. 1								
COC Line No. 2								
COC Line No. 3								
COC Line No. 4								
COC Line No. 5								
COC Line No. 6								
COC Line No. 7								
COC Line No. 8								
COC Line No. 9								
COC Line No. 10								

Comments

pH strip lot No.

☐ OC550297

☐ _____

Aqueous Samples: For each sample and container type, check the box if pH is acceptable. **If pH is not acceptable for any sample container, record pH in box, and note on Sample Receiving Checklist and on Sample Receiving Non-Conformance Form.** If approved by Project Chemist, add acid or base to the sample to achieve the correct pH. Add up to, but do not exceed 2x the volume initially added at container prep (see table below for initial volumes used). **Add orange pH tag to sample container and record information requested. Record adjusted pH on this form. Do not adjust pH for container types 3, 6, and 15.**

COC ID No.			Adjusted by:_____ Date:_____		DO NOT ADJUST pH FOR THESE CONTAINER TYPES			
Container Type	5	4	13		3	6	15	
Tag Color	Lt. Blue	Blue	Brown		Green	Red	Red Stripe	
Preservative	NaOH	H_2SO_4	H_2SO_4		None	HNO_3	HNO_3	
Expected pH	>12	<2	<2		~7	<2	<2	
COC Line No. 1								
COC Line No. 2								
COC Line No. 3								
COC Line No. 4								
COC Line No. 5								
COC Line No. 6								
COC Line No. 7								
COC Line No. 8								
COC Line No. 9								
COC Line No. 10								

Comments

Container Size (mL)	Original Vol. of Preservative (mL)
Container Type 5:	NaOH
500	2.5
1000	5.0
Container Type 4:	H_2SO_4
125	0.5
250	1.0
500	2.0
1000	4.0
Container Type 13	H_2SO_4
500	2.5

Appendix S

TriMatrix Laboratories, Inc.

SAMPLE RECEIVING NON-CONFORMANCE REPORT

Client		Project-Submittal No.
Receipt Log No.	Completed By (initials/date)	Project Chemist

List non-conformance issues associated with this submittal in the chart below/left. Identify discrepancies between the COC and sample tags in the chart below/right. Add comments as needed. Give to Project Chemist for immediate action.

		Type of Problem									
COC ID No.	Line No.	Discrepancy	Missing Container	Broken Container	Label Missing / Incomplete	Label Illegible	Low Volume	Inappropriate Container	Headspace	Not Listed on COC	Preservation

COC					Sample Tag					LIMS Qualifiers entered for this sample
Sample Field ID	Date Sampled	Time Sampled	Container Type	Qty	Sample Field ID	Date Sampled	Time Sampled	Container Type	Qty	

Comments:

Project Chemist (initials/date)

Appendix T

Client: [redacted]
Project: [redacted]

Project Manager: **Jennifer L. Rice**
Project Number: **35035**

Report To:

[redacted]

Invoice To:

[redacted]

Proper Documentation Received?	Labels Complete?	Samples Preserved Correctly?
COC/Labels Agree?	Inappropriate Volume/Containers Received?	Temp Blank Received?
All Container Types on COC Received?	VOC Vials have headspace?	VOC Trip Blank Received?
Containers/Lids Received Intact?	Extra Containers/Containers Not Listed on COC?	

Client Due Date: **Mar-19-07 16:00 (10 day TAT)**
Date Received: Mar-02-07 17:10 5.4°C
Date Logged In: Mar-02-07 08:34
W.O. Comments: *QC is 3RL*

Report Level: **3RL**
Received By: Donna M. Nardin
Logged In By: Kim M. Ziegler

VOC Rack #590 Green.

Analysis	Lab Due Date	TAT	Expires	Analysis Comments
0703020-01 MW-310 [Water] Sampled Feb-28-07 15:20 Effluent				
8260B Standard VOAs	Mar-16-07 17:00	10	Mar-14-07 15:20	
Alkalinity, Total 310.1	Mar-16-07 17:00	10	Mar-14-07 15:20	
As Diss 6020	Mar-16-07 17:00	10	Aug-27-07 15:20	
Ba Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 15:20	
Ca Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 15:20	
Chloride 325.2	Mar-16-07 17:00	10	Mar-28-07 15:20	
Co Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 15:20	
Fe Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 15:20	
K Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 15:20	
Mg Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 15:20	
Mn Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 15:20	
Na Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 15:20	
Ni Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 15:20	
Nitrogen, Ammonia 350.1	Mar-16-07 17:00	10	Mar-28-07 15:20	
Nitrogen, NO3 353.2	Mar-16-07 17:00	10	Mar-02-07 15:20	
Sulfate 375.4 (low level)	Mar-16-07 17:00	10	Mar-28-07 15:20	
TOC 415.1	Mar-16-07 17:00	10	Mar-28-07 15:20	
Zn Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 15:20	
0703020-02 MW-312-2 [Water] Sampled Feb-28-07 15:45 Effluent				acetone only
8260B TCL OLM 4.3 VOAs	Mar-16-07 17:00	10	Mar-14-07 15:45	acetone only
0703020-03 MW-312-3 [Water] Sampled Feb-28-07 16:05 Effluent				acetone only
8260B TCL OLM 4.3 VOAs	Mar-16-07 17:00	10	Mar-14-07 16:05	acetone only

Client: [redacted]
Project: [redacted]

Project Manager: **Jennifer L. Rice**
Project Number: **35035**

Analysis	Lab Due Date	TAT	Expires	Analysis Comments
0703020-04 MW-312-4 [Water] Sampled Feb-28-07 16:25 Eastern				acetone only
8260B TCL OLM 4.3 VOAs	Mar-16-07 17:00	10	Mar-14-07 16:25	acetone only
0703020-05 Field Blank-312 [Water] Sampled Feb-28-07 15:20 Eastern				
8260B Standard VOAs	Mar-16-07 17:00	10	Mar-14-07 15:20	
0703020-06 MW-323 [Water] Sampled Feb-28-07 10:02 Eastern				
8260B Standard VOAs	Mar-16-07 17:00	10	Mar-14-07 10:02	
Alkalinity, Total 310.1	Mar-16-07 17:00	10	Mar-14-07 10:02	
As Diss 6020	Mar-16-07 17:00	10	Aug-27-07 10:02	
Ba Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 10:02	
Ca Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 10:02	
Chloride 325.2	Mar-16-07 17:00	10	Mar-28-07 10:02	
Co Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 10:02	
Fe Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 10:02	
K Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 10:02	
Mg Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 10:02	
Mn Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 10:02	
Na Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 10:02	
Ni Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 10:02	
Nitrogen, Ammonia 350.1	Mar-16-07 17:00	10	Mar-28-07 10:02	
Nitrogen, NO3 353.2	Mar-16-07 17:00	10	Mar-02-07 10:02	
Sulfate 375.4 (low level)	Mar-16-07 17:00	10	Mar-28-07 10:02	
TOC 415.1	Mar-16-07 17:00	10	Mar-28-07 10:02	
Zn Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 10:02	
0703020-07 MW-323-1 [Water] Sampled Feb-28-07 10:32 Eastern				
K Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 10:32	
Nitrogen, Ammonia 350.1	Mar-16-07 17:00	10	Mar-28-07 10:32	
0703020-08 MW-328-3 [Water] Sampled Feb-28-07 11:02 Eastern				
K Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 11:02	
Nitrogen, Ammonia 350.1	Mar-16-07 17:00	10	Mar-28-07 11:02	
0703020-09 MW-328-4 [Water] Sampled Feb-28-07 11:32 Eastern				
K Diss 6010B	Mar-16-07 17:00	10	Aug-27-07 11:32	
Nitrogen, Ammonia 350.1	Mar-16-07 17:00	10	Mar-28-07 11:32	
0703020-10 Trip Blank-328 [Water] Sampled Feb-28-07 [illegible] Eastern				
8260B Standard VOAs	Mar-16-07 17:00	10	Mar-14-07 10:02	
0703020-11 Trip Blank [Water] Sampled Feb-28-07 00:00 Eastern				
8260B Standard VOAs	Mar-16-07 17:00	10	Mar-14-07 00:00	

Client:	[redacted]	Project Manager:	**Jennifer L. Rice**
Project:	[redacted]	Project Number:	**35035**

Client: [redacted]
Project: [redacted]

Project Manager: **Jennifer L. Rice**
Project Number: **35035**

Inorganic - Wet Chemistry Analysis Detail

* indicates custom

Matrix	Analysis	Unit	MDL	RL
Water	Alkalinity, Total 310.1	mg/L	0.794	*10
Water	Chloride 325.2	mg/L	0.899	*10
Water	Nitrogen, Ammonia 350.1	mg/L	0.005	0.05
Water	Nitrogen, NO3 353.2	mg/L	0.0037	*0.1
Water	Sulfate 375.4 (low level)	mg/L	0.435	1
Water	TOC 415.1	mg/L	0.23	*0.5

Metals Analysis Detail

* indicates custom

	Analysis	Unit	MDL	RL
Water	USEPA 6010B			
	Ba Diss 6010B	ug/L	1	*200
	Ca Diss 6010B	mg/L	0.0405	0.5
	Co Diss 6010B	ug/L	4.36	10
	Fe Diss 6010B	ug/L	5.73	*100
	K Diss 6010B	mg/L	0.0536	*0.2
	Mg Diss 6010B	mg/L	0.0375	0.5
	Mn Diss 6010B	ug/L	0.667	*20
	Na Diss 6010B	mg/L	0.0835	*1
	Ni Diss 6010B	ug/L	6.26	*50
	Zn Diss 6010B	ug/L	8.16	20
Water	USEPA 7062A			
	As Diss 6020	ug/L	0.743	*5

Volatiles MS Analysis Detail

* indicates custom

	Analyte	CLrept?	QCrept?	MDL	RL
Water	8260B Standard VOAs	ug/L			
	Acetone	Y		1.19	*100
	Benzene	Y	Y	0.118	*5
	Bromochloromethane	Y		0.195	1
	Bromodichloromethane	Y		0.194	1
	Bromoform	Y		0.23	1
	Bromomethane	Y		0.191	1
	Carbon Disulfide	Y		0.285	*50
	Carbon Tetrachloride	Y		0.153	1
	Chlorobenzene	Y	Y	0.12	1
	Chloroethane	Y		0.202	1
	Chloroform	Y		0.0613	1
	Chloromethane	Y		0.0598	1
	1,2-Dibromo-3-chloropropane	Y		0.29	1
	Dibromochloromethane	Y		0.138	1
	1,2-Dibromoethane	Y		0.221	1
	1,2-Dichlorobenzene	Y		0.0651	1
	1,3-Dichlorobenzene	Y		0.12	1

Client: [redacted]
Project: [redacted]

Project Manager: **Jennifer L. Rice**
Project Number: **35035**

Volatiles MS Analysis Detail

Analyte	CLrept?	QCrept?	* indicates custom MDL	RL
1,4-Dichlorobenzene	Y		0.133	1
1,1-Dichloroethane	Y		0.0764	1
1,2-Dichloroethane	Y		0.153	1
1,1-Dichloroethene	Y	Y	0.139	1
cis-1,2-Dichloroethene	Y		0.166	1
trans-1,2-Dichloroethene	Y		0.158	1
1,2-Dichloropropane	Y		0.103	1
cis-1,3-Dichloropropene	Y		0.143	1
trans-1,3-Dichloropropene	Y		0.156	1
Ethylbenzene	Y		0.132	1
2-Hexanone	Y		0.425	*50
Methylene Chloride	Y		0.0508	*5
2-Butanone (MEK)	Y		0.329	*50
4-Methyl-2-pentanone (MIBK)	Y		0.382	*50
Styrene	Y		0.109	1
1,1,2,2-Tetrachloroethane	Y		0.101	1
Tetrachloroethene	Y		0.149	1
Toluene	Y	Y	0.0719	1
1,1,1-Trichloroethane	Y		0.11	1
1,1,2-Trichloroethane	Y		0.206	1
Trichloroethene	Y	Y	0.171	1
Vinyl Chloride	Y		0.174	1
Xylene (Total)	Y		0.358	3
Water	**8260B+TCL OLM 4.3 VOAs**		**ug/L**	
Acetone	Y	Y	1.19	*100

Appendix U

Volatiles MS Sample Receipt Notice

Client: [redacted]
Project: [redacted]
Client Due Date: **Mar-29-07 16:00 (10 day TAT)**
W.O. Comments: *3RL*

VOC Rack #416 White & #318 Green.

Project Manager: **Gary L. Wood**
Project Number: **35961**
Report Level: **3RL**

Lab Number	Sample Name / Analysis	Matrix	Sampled Date / TAT	Expire Date	Sample Comments / Lab Due Date	Comments
[redacted]						
	8260B TCL+ VOAs		10	Mar-28-07 11:35	Mar-28-07 17:00	TCL + THF; some PSRLs
[redacted]						
	8260B TCL+ VOAs		10	Mar-28-07 12:20	Mar-28-07 17:00	TCL + THF; some PSRLs
[redacted]						
	8260B TCL+ VOAs		10	Mar-28-07 12:55	Mar-28-07 17:00	TCL + THF; some PSRLs
[redacted]						
	8260B TCL+ VOAs		10	Mar-28-07 13:55	Mar-28-07 17:00	TCL + THF; some PSRLs
[redacted]						
	8260B TCL+ VOAs		10	Mar-28-07 14:00	Mar-28-07 17:00	TCL + THF; some PSRLs
[redacted]						
	8260B TCL+ VOAs		10	Mar-28-07 15:30	Mar-28-07 17:00	TCL + THF; some PSRLs
[redacted]						
	8260B TCL+ VOAs		10	Mar-28-07 14:30	Mar-28-07 17:00	TCL + THF; some PSRLs
[redacted]						
	8260B TCL+ VOAs		10	Mar-28-07 16:30	Mar-28-07 17:00	TCL + THF; some PSRLs
[redacted]						
	8260B TCL+ VOAs		10	Mar-28-07 11:55	Mar-28-07 17:00	TCL + THF; some PSRLs
[redacted]						
	8260B TCL+ VOAs		10	Mar-28-07 16:05	Mar-28-07 17:00	TCL + THF; some PSRLs
[redacted]						
	8260B TCL+ VOAs		10	Mar-28-07 00:00	Mar-28-07 17:00	TCL + THF; some PSRLs

Volatiles MS Analysis Detail

Analyte	CLrept?	QCrept?	* indicates custom MDL	RL
Water				
Chloromethane	Y	Y	*0.478	1
Vinyl Chloride	Y	Y	*0.349	1
Bromomethane	Y	Y	*0.642	1
Chloroethane	Y	Y	*0.567	1
Bromochloromethane			0.195	1
1,1-Dichloroethene	Y	Y	*0.999	1
Acetone	Y	Y	*3.383	*25
Carbon Disulfide	Y	Y	*0.211	5
Methylene Chloride	Y	Y	*0.741	*5
trans-1,2-Dichloroethene	Y	Y	*0.329	1
1,1-Dichloroethane	Y	Y	*0.239	1
cis-1,2-Dichloroethene	Y	Y	*0.319	1
2-Butanone (MEK)	Y	Y	*0.746	*25
Chloroform	Y	Y	*0.196	1
1,1,1-Trichloroethane	Y	Y	*0.38	1
Carbon Tetrachloride	Y	Y	*0.255	1
Benzene	Y	Y	*0.193	1
1,2-Dichloroethane	Y	Y	*0.222	1
Trichloroethene	Y	Y	*0.355	1
1,2-Dichloropropane	Y	Y	*0.465	1
Bromodichloromethane	Y	Y	*0.728	1
cis-1,3-Dichloropropene	Y	Y	*0.273	1
4-Methyl-2-pentanone (MIBK)	Y	Y	*0.822	*50
Toluene	Y	Y	*0.325	1
trans-1,3-Dichloropropene	Y	Y	*0.297	1
1,1,2-Trichloroethane	Y	Y	*0.323	1
Tetrachloroethene	Y	Y	*0.297	1
2-Hexanone	Y	Y	*2.076	*50
Dibromochloromethane	Y	Y	*0.343	1
Chlorobenzene	Y	Y	*0.246	1
Ethylbenzene	Y	Y	*0.105	1
Xylene (Total)	Y	Y	*0.162	3
Tetrahydrofuran	Y	Y	*2.41	10
Styrene	Y	Y	*0.188	1
Bromoform	Y	Y	*0.472	1
1,1,2,2-Tetrachloroethane	Y	Y	*0.269	1
1,2,3-Trichlorobenzene			0.133	1

Semivolatiles MS Sample Receipt Notice

Client: [redacted]
Project: [redacted]
Client Due Date: **Mar-26-07 16:00 (10 day TAT)**
W.O. Comments: *4RL*
[redacted]
VOC Rack #365, 358, 43 Green

Project Manager: **Gary L. Wood**
Project Number: **32683**
Report Level: **4RL**

Lab Number	Sample Name / Analysis	Matrix	TAT	Sampled Date / Expire Date	Sample Comments / Lab Due Date	Comments
0703162-01	EW-27-1	Water		Mar-07-07 15:10 Eastern	MS/MSD [redacted]	8260/8270 in Wtr
	8270C Standard SVOCs		10	Mar-14-07 15:10	Mar-23-07 17:00 [redacted]	8270 SVOCs
0703162-02	EW-27-2	Water		Mar-07-07 14:32 Eastern	[redacted]	8260/8270 in Wtr
	8270C Standard SVOCs		10	Mar-14-07 14:32	Mar-23-07 17:00 [redacted]	8270 SVOCs
0703162-03	EW-27-3	Water		Mar-07-07 17:35 Eastern	[redacted]	8260/8270 in Wtr
	8270C Standard SVOCs		10	Mar-14-07 17:35	Mar-23-07 17:00 [redacted]	8270 SVOCs
0703162-04	EW-27-4	Water		Mar-07-07 14:30 Eastern	[redacted]	8260/8270 in Wtr
	8270C Standard SVOCs		10	Mar-14-07 15:30	Mar-23-07 17:00 [redacted]	8270 SVOCs
[redacted]	[redacted]	Water		[redacted] Eastern	[redacted]	8260/8270 in Wtr
	8270C Standard SVOCs		10	Mar-14-07 18:00	Mar-23-07 17:00 [redacted]	8270 SVOCs
0703162-06	MW-27-3	Water		Mar-07-07 15:50 Eastern	[redacted]	8260/8270 in Wtr
	8270C Standard SVOCs		10	Mar-14-07 15:50	Mar-23-07 17:00 [redacted]	8270 SVOCs
0703162-07	MW-27-6	Water		Mar-07-07 13:05 Eastern	[redacted]	8260/8270 in Wtr
	8270C Standard SVOCs		10	Mar-14-07 13:05	Mar-23-07 17:00 [redacted]	8270 SVOCs
0703162-08	MW-27-9	Water		Mar-07-07 13:05 Eastern	[redacted]	8260/8270 in Wtr
	8270C Standard SVOCs		10	Mar-14-07 13:05	Mar-23-07 17:00 [redacted]	8270 SVOCs
0703162-09	MW-27-10	Water		Mar-07-07 18:10 Eastern	[redacted]	8260/8270 in Wtr
	8270C Standard SVOCs		10	Mar-14-07 18:10	Mar-23-07 17:00 [redacted]	8270 SVOCs
0703162-10	MW-27-17	Water		Mar-07-07 16:00 Eastern	[redacted]	8260/8270 in Wtr
	8270C Standard SVOCs		10	Mar-14-07 16:00	Mar-23-07 17:00 [redacted]	8270 SVOCs
0703162-11	MW-27-18	Water		Mar-07-07 12:10 Eastern	[redacted]	8260/8270 in Wtr
	8270C Standard SVOCs		10	Mar-14-07 12:10	Mar-23-07 17:00 [redacted]	8270 SVOCs
0703162-12	MW-27-19	Water		Mar-07-07 12:40 Eastern	[redacted]	8260/8270 in Wtr
	8270C Standard SVOCs		10	Mar-14-07 12:40	Mar-23-07 17:00 [redacted]	8270 SVOCs
0703162-13	MW-5	Water		Mar-06-07 14:32 Eastern	[redacted]	8260/8270 in Wtr
	8270C Standard SVOCs		10	Mar-15-07 14:32	Mar-23-07 17:00 [redacted]	8270 SVOCs
0703162-14	EW-27-4 DUP	Water		Mar-07-07 15:30 Eastern	[redacted]	8260/8270 in Wtr
	8270C Standard SVOCs		10	Mar-14-07 15:30	Mar-23-07 17:00 [redacted]	8270 SVOCs
0703162-15	EB-030406	Water		Mar-07-07 15:00 Eastern	[redacted]	8260/8270 in Wtr
	8270C Standard SVOCs		10	Mar-14-07 15:00	Mar-23-07 17:00 [redacted]	8270 SVOCs
0703162-16	MW27-9 DUP	Water		Mar-07-07 13:05 Eastern	[redacted]	8260/8270 in Wtr
	8270C Standard SVOCs		10	Mar-14-07 13:05	Mar-23-07 17:00 [redacted]	8270 SVOCs

Semivolatiles MS Analysis Detail

* indicates custom

	Analyte	CLrept?	QCrept?	MDL	RL
Water	8270C Standard SVOCs	ug/L			
	Acenaphthene	Y	Y	0.0213	*5
	Acenaphthylene	Y	Y	0.038	*5
	Aniline	Y	Y	0.421	*5
	Anthracene	Y	Y	0.03	*5
	Benzo(a)anthracene	Y	Y	0.0581	*5
	Benzo(a)pyrene	Y	Y	0.031	*5
	Benzo(b)fluoranthene	Y	Y	0.0375	*5
	Benzo(k)fluoranthene	Y	Y	0.0481	*5
	Benzo(g,h,i)perylene	Y	Y	0.0301	*5
	Benzoic Acid	Y	Y	0.542	*50
	Benzyl Alcohol	Y	Y	0.0377	*50
	4-Bromophenyl Phenyl Ether	Y	Y	0.0387	*5
	Butyl Benzyl Phthalate	Y	Y	0.762	*5
	4-Chloro-3-methylphenol	Y	Y	0.0245	*5
	4-Chloroaniline	Y	Y	0.928	*20
	Bis(2-chloroethoxy)methane	Y	Y	0.0218	*5
	Bis(2-chloroethyl) Ether	Y	Y	0.0394	*5
	Bis(2-chloroisopropyl) Ether	Y	Y	0.0472	*5
	2-Chloronaphthalene	Y	Y	0.0125	*5
	2-Chlorophenol	Y	Y	0.0285	*5
	4-Chlorophenyl Phenyl Ether	Y	Y	0.0289	*5
	Chrysene	Y	Y	0.0301	*5
	Dibenz(a,h)anthracene	Y	Y	0.0189	*5
	Dibenzofuran	Y	Y	0.0136	*5
	Di-n-butyl Phthalate	Y	Y	0.813	*5
	1,2-Dichlorobenzene	Y	Y	0.0206	*5
	1,3-Dichlorobenzene	Y	Y	0.0226	*5
	1,4-Dichlorobenzene	Y	Y	0.022	*5
	3,3'-Dichlorobenzidine	Y	Y	0.0482	*20
	2,4-Dichlorophenol	Y	Y	0.0224	*5
	Diethyl Phthalate	Y	Y	0.0525	*5
	2,4-Dimethylphenol	Y	Y	0.545	*5
	Dimethyl Phthalate	Y	Y	0.0204	*5
	4,6-Dinitro-2-methylphenol	Y	Y	0.238	*20
	2,4-Dinitrophenol	Y	Y	0.208	*20
	2,4-Dinitrotoluene	Y	Y	0.0359	*5
	2,6-Dinitrotoluene	Y	Y	0.0752	*5
	Di-n-octyl Phthalate	Y	Y	0.041	*5
	Bis(2-ethylhexyl) Phthalate	Y	Y	0.497	*5
	Fluoranthene	Y	Y	0.033	*5
	Fluorene	Y	Y	0.0269	*5
	Hexachlorobenzene	Y	Y	0.0334	*5
	Hexachlorobutadiene	Y	Y	0.0149	*5
	Hexachlorocyclopentadiene	Y	Y	0.239	*5
	Hexachloroethane	Y	Y	0.0293	*5
	Indeno(1,2,3-cd)pyrene	Y	Y	0.0208	*5
	Isophorone	Y	Y	0.0254	*5
	2-Methylnaphthalene	Y	Y	0.0223	*5
	2-Methylphenol	Y	Y	0.451	*5
	4-Methylphenol	Y	Y	0.381	*5

Semivolatiles MS Analysis Detail

Analyte	CLrept?	QCrept?	MDL	* indicates custom RL
Naphthalene	Y	Y	0.022	*5
2-Nitroaniline	Y	Y	0.276	*20
3-Nitroaniline	Y	Y	0.71	*20
4-Nitroaniline	Y	Y	0.452	*20
Nitrobenzene	Y	Y	0.0532	*5
4-Nitrophenol	Y	Y	0.44	*10
2-Nitrophenol	Y	Y	0.0377	*5
N-Nitroso-diphenylamine	Y	Y	0.0371	*5
N-Nitroso-di-n-propylamine	Y	Y	0.0366	*5
Pentachlorophenol	Y	Y	0.061	*20
Phenanthrene	Y	Y	0.0327	*5
Phenol	Y	Y	0.0546	*5
Pyrene	Y	Y	0.0439	*5
2,3,4,6-Tetrachlorophenol	Y	Y	0.0467	*10
1,2,4-Trichlorobenzene	Y	Y	0.0202	*5
2,4,6-Trichlorophenol	Y	Y	0.0251	*5
2,4,5-Trichlorophenol	Y	Y	0.0303	*50

TriMatrix Laboratories, Inc.

PREPARATION BATCH 0702289

Printed: 3/13/2007 1:42:26PM

Semivolatiles MS, Water, 3510C Liquid-Liquid Extraction

Surrogate #1 = 6120791 (Pre-Prep)

Batch Comments: (none)

Work Order	Analysis
0703070	8270C MDEQ BNA

Work Order	Analysis
0703087	8270C MDEQ PNA

Work Order	Analysis

Lab Number	Contain	Prepared	By	Initial (mL)	Final (mL)	uL Surrogate	Source ID	Spike ID	uL Spike	Client / QC Type	Extraction Comments
0702289-BLK1		Mar-08-07 07:49	RRH	1000	1	100				BLANK	
0702289-BS1		Mar-08-07 07:49	RRH	1000	1	100		A610964	100	LCS	
0702289-BSD1		Mar-08-07 07:49	RRH	1000	1	100		A610964	100	LCS DUP	
0703070-09	C	Mar-08-07 07:49	RRH	1030	1	100				[redacted]	PNAs+Phenols; full QC
0703087-01	D	Mar-08-07 07:49	RRH	1060	1	100				[redacted]	
0703087-02	D	Mar-08-07 07:49	RRH	1060	1	100				[redacted]	
0703087-03	D	Mar-08-07 07:49	RRH	1050	1	100				[redacted]	
0703087-04	D	Mar-08-07 07:49	RRH	1050	1	100				[redacted]	
0703087-05	D	Mar-08-07 07:49	RRH	1060	1	100				[redacted]	
0703087-06	D	Mar-08-07 07:49	RRH	1060	1	100				[redacted]	
0703087-07	C	Mar-08-07 07:49	RRH	1060	1	100				[redacted]	
0703087-08	C	Mar-08-07 07:49	RRH	1020	1	100				[redacted]	
0703087-09	C	Mar-08-07 07:49	RRH	1050	1	100				[redacted]	
0703087-10	D	Mar-08-07 07:49	RRH	1030	1	100				[redacted]	
0703087-11	C	Mar-08-07 07:49	RRH	1050	1	100				[redacted]	
0703087-12	C	Mar-08-07 07:49	RRH	1030	1	100				[redacted]	
0703087-13	D	Mar-08-07 07:49	RRH	1040	1	100				[redacted]	
0703087-14	C	Mar-08-07 07:49	RRH	1050	1	100				[redacted]	
0703087-15	C	Mar-08-07 07:49	RRH	1040	1	100				[redacted]	

Comments:

Analyst Initials:

Volatiles MS, Water, Mar-08-07

Instrument = 224, Calibration = 7C01020

Sequence Analyses:
8260B MDEQ+ VOAs 8260B Standard VOAs

Lab Number	*Analysis*	*Contain*	*STD ID*	*ISTD ID*	*Client / QC Type*	*Extraction Comments*
7030909-TUN1	QC		A610800	A609663	MS TUNE	
0702362-BS1	QC			A609663	LCS	
0702362-BLK1	QC			A609663	BLANK	
0703101-01	8260B Standard VOAs	A		A609663	[redacted]	
0703101-02	8260B Standard VOAs	A		A609663	[redacted]	
0703101-03	8260B Standard VOAs	A		A609663	[redacted]	
0703102-01	8260B Standard VOAs	A		A609663	[redacted]	
0703102-02	8260B Standard VOAs	A		A609663	[redacted]	
0703113-02	8260B MDEQ+ VOAs	A		A609663	[redacted]	PCE,TCE,t12DCE only - Wtr=8260
0703113-03	8260B MDEQ+ VOAs	A		A609663	[redacted]	PCE,TCE,t12DCE only - Wtr=8260
0703113-04	8260B MDEQ+ VOAs	A		A609663	[redacted]	PCE,TCE,t12DCE only - Wtr=8260
0703113-05	8260B MDEQ+ VOAs	A		A609663	[redacted]	PCE,TCE,t12DCE only - Wtr=8260
0703113-06	8260B MDEQ+ VOAs	A		A609663	[redacted]	PCE,TCE,t12DCE only - Wtr=8260
0703113-08	8260B MDEQ+ VOAs	A		A609663	[redacted]	PCE,TCE,t12DCE only - Wtr=8260
0702362-MS1	QC			A609663	MATRIX SPIKE	
0702362-MSD1	QC			A609663	MATRIX SPIKE DUP	

Comments:

Analyst Initials:

seq_TriMatrix.rpt

Department (Inorganic - Wet Chemistry) Mar-11-07 - Mar-17-07

Available,Batched,Received

Lab Number	Analysis	Matrix	RptLev	RTAT	Due	Expires	Status	Client	Project	Sample [Analysis] Comments
0703023-15	Solids, Total 3550B (9	Soil	3RL	10	Mar-15-07	Mar-15-07	Available	[redacted]	[redacted]	d-MeOH blank, no %S
0703116-01	Solids, TSS 160.2	Waste Water	1RL	10	Mar-21-07	Mar-15-07	Batched	[redacted]	[redacted]	[RL = 5 mg/L]
0703117-01	Solids, TSS 160.2	Waste Water	2RL	10	Mar-21-07	Mar-15-07	Batched	[redacted]	[redacted]	
0703135-01	Sulfide 376.2	Water	4MD	10	Mar-22-07	Mar-15-07	Batched	[redacted]	[redacted]	Wtr: Same as 01 less TOX
0703135-02	Sulfide 376.2	Water	4MD	10	Mar-22-07	Mar-15-07	Batched	[redacted]	[redacted]	Wtr: Same as 01 less TOX
0703135-03	Sulfide 376.2	Water	4MD	10	Mar-22-07	Mar-14-07	Batched	[redacted]	[redacted]	Wtr: Same as 09 + Ca/Na/Mg (6010)
0703135-04	Sulfide 376.2	Water	4MD	10	Mar-22-07	Mar-14-07	Batched	[redacted]	[redacted]	Wtr: Same as 01 less TOX
0703135-05	Sulfide 376.2	Water	4MD	10	Mar-22-07	Mar-15-07	Batched	[redacted]	[redacted]	Wtr: Same as 01 less TOX
0703135-06	Sulfide 376.2	Water	4MD	10	Mar-22-07	Mar-15-07	Batched	[redacted]	[redacted]	Wtr: Same as 01 less TOX
0703135-07	Sulfide 376.2	Water	4MD	10	Mar-22-07	Mar-15-07	Batched	[redacted]	[redacted]	Wtr: Same as 01 less TOX
0703135-08	Sulfide 376.2	Water	4MD	10	Mar-22-07	Mar-15-07	Batched	[redacted]	[redacted]	Wtr: Same as 01 less TOX
0703135-09	Sulfide 376.2	Water	4MD	10	Mar-22-07	Mar-14-07	Batched	[redacted]	[redacted]	Wtr: Same as 01 less TOX
0703135-10	Sulfide 376.2	Water	4MD	10	Mar-22-07	Mar-14-07	Batched	[redacted]	[redacted]	Wtr: Same as 09 + Ca/Na/Mg (6010)
0703135-11	Sulfide 376.2	Water	4MD	10	Mar-22-07	Mar-14-07	Batched	[redacted]	[redacted]	Wtr: Same as 01 less TOX
0703135-12	Sulfide 376.2	Water	4MD	10	Mar-22-07	Mar-14-07	Batched	[redacted]	[redacted]	Wtr: Same as 01 less TOX
0703135-13	Sulfide 376.2	Water	4MD	10	Mar-22-07	Mar-14-07	Batched	[redacted]	[redacted]	Wtr: Same as 01 less TOX
0703143-01	Cyanide SPLP 9014	Soil	2RL	10	Mar-22-07	Mar-17-07	Batched	[redacted]	[redacted]	
0703154-01	Phosphorus, Total 365	Water	4RL	4	Mar-16-07	Mar-16-07	Batched	[redacted]	[redacted]	
0703156-01	Nitrogen, NO3 353.2	Water	4RL	10	Mar-23-07	Mar-11-07	Batched	[redacted]	22/24-001BH07200; [redacted]	met,#3,#4,TOC,LLHg,NO3
0703156-01	Solids, TDS 160.1	Water	4RL	10	Mar-23-07	Mar-16-07	Batched	[redacted]	22/24-001BH07200; [redacted]	met,#3,#4,TOC,LLHg,NO3 [RL = 3 mg/L]
0703156-01	Solids, TSS 160.2	Water	4RL	10	Mar-23-07	Mar-16-07	Batched	[redacted]	22/24-001BH07200; [redacted]	met,#3,#4,TOC,LLHg,NO3 [RL = 3 mg/L]
0703156-02	Nitrogen, NO3 353.2	Water	4RL	10	Mar-23-07	Mar-11-07	Batched	[redacted]	22/24-001BH07200; [redacted]	met,#3,#4,TOC,LLHg,NO3
0703156-02	Solids, TDS 160.1	Water	4RL	10	Mar-23-07	Mar-16-07	Batched	[redacted]	22/24-001BH07200; [redacted]	met,#3,#4,TOC,LLHg,NO3 [RL = 3 mg/L]
0703156-02	Solids, TSS 160.2	Water	4RL	10	Mar-23-07	Mar-16-07	Batched	[redacted]	22/24-001BH07200; [redacted]	met,#3,#4,TOC,LLHg,NO3 [RL = 3 mg/L]
0703156-03	Nitrogen, NO3 353.2	Water	4RL	10	Mar-23-07	Mar-11-07	Batched	[redacted]	22/24-001BH07200; [redacted]	met,#3,#4,TOC,LLHg,NO3

Appendix V

TriMatrix Laboratories, Inc. - Department

Work Orders Received Mar-14-07 to Mar-16-07 - Printed Mar-15-07 14:32 by JPG

Department	Samples	Analyses	Price	Surcharge	Total
Inorganic - Wet Chemistry	67	306	$7,564.03	$321.00	$7,885.03
Metals	51	630	$8,761.00	$582.00	$9,343.00
Semivolatiles GC	26	34	$3,053.00	$222.00	$3,275.00
Semivolatiles MS	28	38	$7,852.00	$748.00	$8,600.00
Volatiles GC	1	1	$85.00	$0.00	$85.00
Volatiles MS	78	84	$8,840.00	$361.00	$9,201.00
****TOTALS****	**251**	**1093**	**$36,155.03**	**$2,234.00**	**$38,389.03**

TriMatrix Laboratories, Inc. - % On-Time by Department [Feb-01-07 to Feb-28-07]

Printed Mar-15-07 14:31 by JPG

Department: [All]

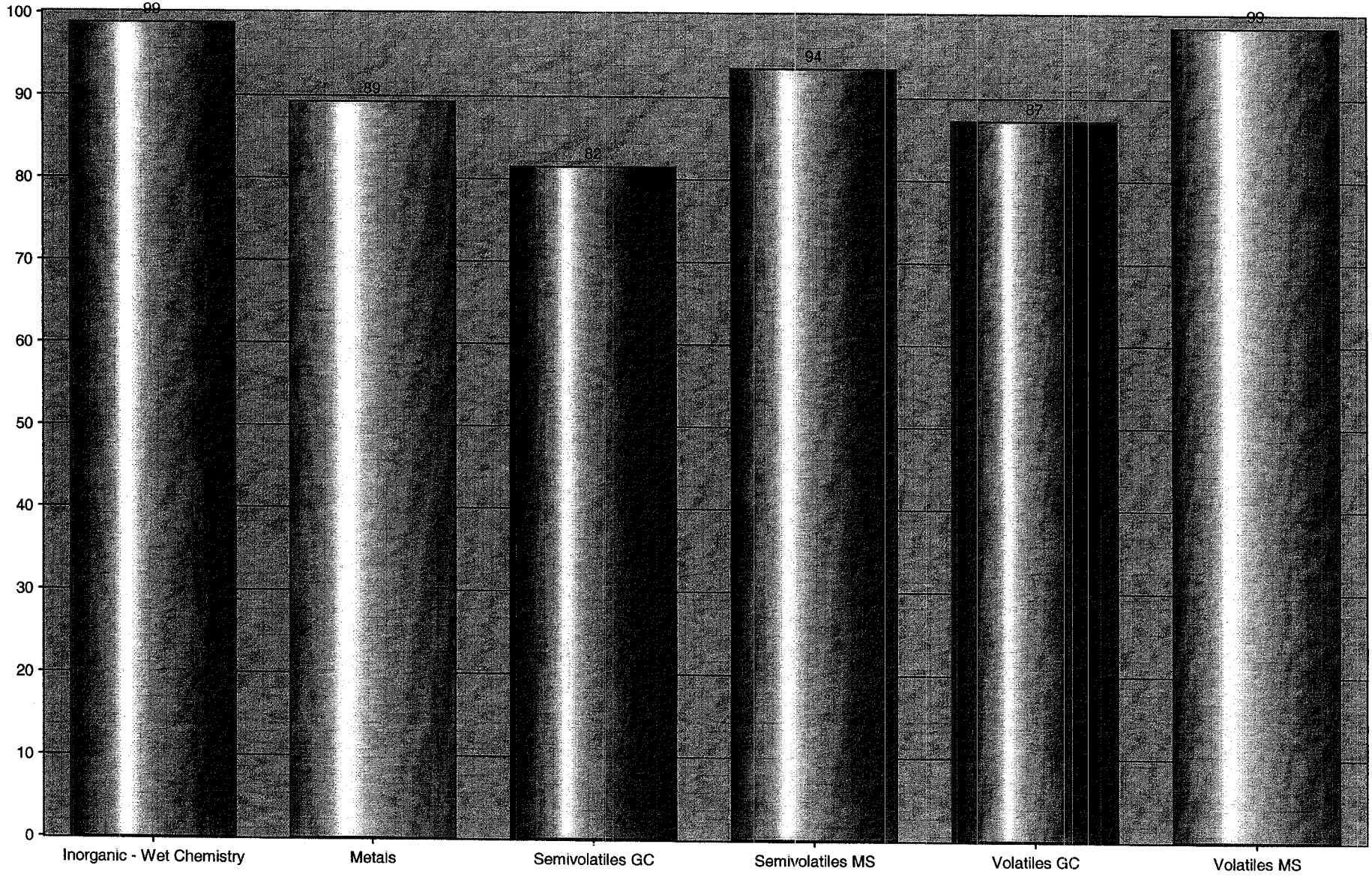
Analysis: [All]

Matrix: [All]

Department	On-Time	Total	%
Inorganic - Wet Chemistry	3682	3726	98.8
Metals	6239	6983	89.3
Semivolatiles GC	330	405	81.5
Semivolatiles MS	259	277	93.5
Volatiles GC	75	86	87.2
Volatiles MS	559	567	98.6

TriMatrix Laboratories, Inc. - % On-Time by Department [Feb-01-07 to Feb-28-07]

Printed Mar-15-07 14:31 by JPG
Department: [All]
Analysis: [All]
Matrix: [All]



WORK ORDER STATUS REPORT

GLASERJ All Work Ord (All Work Orders) Feb-03-07 - Mar-19-07

Available,Received

Work Order	Done	RptLvl	Pending	Status	Client	Project Name (Number)	PMgr	TAT	Received	Due
0702394	48/48	2RLM		Available	[redacted]	[redacted] (35184)	Lisa M.	10	Feb-27-07	Mar-13-07
0702419	15/15	4MD		Received	[redacted]	[redacted]	Douglas	10	Feb-28-07	Mar-14-07
0702418	103/103	3RL		Available	[redacted]	[redacted] (35129)	Jennifer	12	Feb-27-07	Mar-15-07
0703002	52/52	3FL		Available	[redacted]	F019 Waste Verification (36587)	Walter .	11	Feb-28-07	Mar-15-07
0703003	83/83	3RL		Available	[redacted]	[redacted] (35129)	Jennifer	10	Feb-28-07	Mar-15-07
0703009	175/175	2RL		Available	[redacted]	[redacted] - New Wells (35129)	Jennifer	10	Feb-28-07	Mar-15-07
0703097	9/9	2FLM		Available	[redacted]	[redacted] (35587)	Lisa M.	5	Mar-07-07	Mar-15-07
0702183	104/104	2RLM		Available	[redacted]	[redacted]	Gary L.	22	Feb-14-07	Mar-16-07
0703023	312/313	3RL	Inorganic - Wet Chemistry(1)	Available	[redacted]	[redacted] Soil Sampling (070096)	Lisa M.	10	Mar-01-07	Mar-16-07
0703028	21/21	2FLM		Available	[redacted]	Wastewater Monitoring (0700021)	Lisa M.	10	Mar-01-07	Mar-16-07
0703031	52/52	3FL		Available	[redacted]	[redacted] (50012)	Walter .	10	Mar-02-07	Mar-16-07
0703083	80/83	4RL	Metals(3)	Available	[redacted]	[redacted] Interim Actions ([none])	Gary L.	10	Mar-02-07	Mar-16-07
0703104	31/32	2FL	Metals(1)	Available	[redacted]	[redacted] ([none])	Gary L.	6	Mar-08-07	Mar-16-07
0703136	1/1	1RL		Available	[redacted]	[redacted] (36514)	Lisa M.	5	Mar-09-07	Mar-16-07
0703154	9/12	4RL	Inorganic - Wet Chemistry(3)	Available	[redacted]	[redacted] 47--47 (36287)	Jennifer	4	Mar-10-07	Mar-16-07
0703155	4/10	3MD	Metals(4), Inorganic - Wet Chemistry(2)	Available	[redacted]	[redacted] (35655)	Jennifer	4	Mar-10-07	Mar-16-07

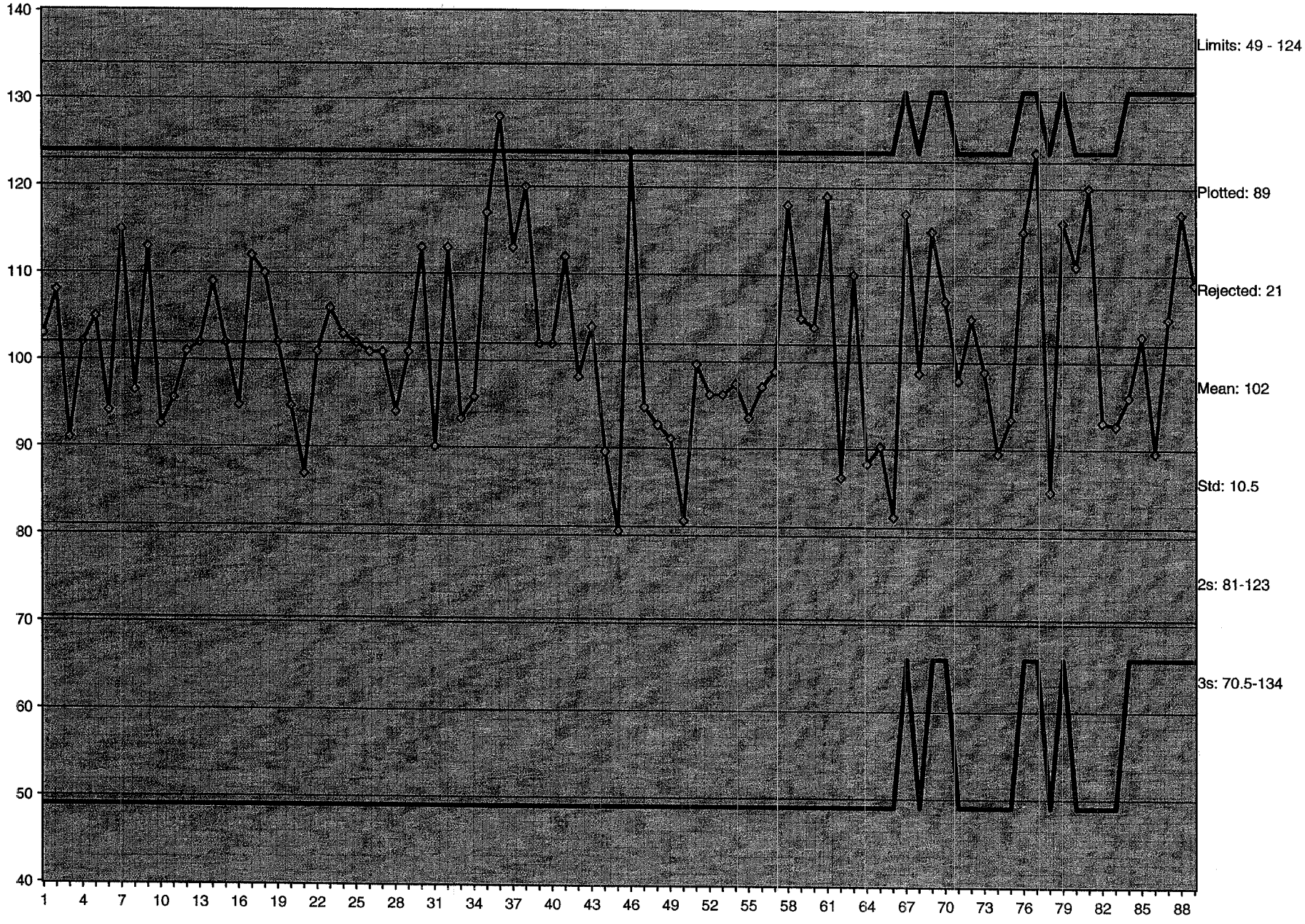
Department (Inorganic - Wet Chemistry) Mar-01-07 - Mar-29-07

Analyzed,Available,Batched,Leached,Prepared,Received

Lab Number	Analysis	Matrix	RptLev	RTAT	Due	Expires	Status	Client	Project	Sample [Analysis] Comments
0703118-01	8270C TCLP SVOC o	Waste	2FLM	10	Mar-21-07	Mar-14-07	Analyzed	[redacted]	Waste Characterization	
0703118-02	8270C TCLP SVOC o	Waste	2FLM	10	Mar-21-07	Mar-14-07	Analyzed	[redacted]	Waste Characterization	
0703118-03	8270C TCLP SVOC o	Waste	2FLM	10	Mar-21-07	Mar-14-07	Analyzed	[redacted]	Waste Characterization	
0703133-01	8270C MDEQ PNA	Water	2RLM	10	Mar-22-07	Mar-13-07	Analyzed	[redacted]	WSC PCB Area	C-VOC, PNAs [not field filtered, watch tags!]
0703133-03	8270C MDEQ PNA	Water	2RLM	10	Mar-22-07	Mar-13-07	Analyzed	[redacted]	WSC PCB Area	C-VOC, PNAs [not field filtered, watch tags!]
0703133-05	8270C MDEQ PNA	Water	2RLM	10	Mar-22-07	Mar-14-07	Analyzed	[redacted]	WSC PCB Area	C-VOC, PNAs [not field filtered, watch tags!]
0703133-09	8270C MDEQ PNA	Water	2RLM	10	Mar-22-07	Mar-14-07	Analyzed	[redacted]	WSC PCB Area	C-VOC, PNAs [not field filtered, watch tags!]
0703137-01	8270C TCLP SVOC o	Waste	2FLB	10	Mar-21-07	Mar-15-07	Analyzed	[redacted]	Miscellaneous Testing	Waste: pH & TCLP V/SV/ME
0703162-04	8270C Standard SVO(	Water	4RL	10	Mar-23-07	Mar-14-07	Prepared	[redacted]	[redacted]	GE Mt Vernon 8260/8270 in Wtr [GE Mt. Vernon 8270
0703162-05	8270C Standard SVO(	Water	4RL	10	Mar-23-07	Mar-14-07	Prepared	[redacted]	[redacted]	GE Mt Vernon 8260/8270 in Wtr [GE Mt. Vernon 8270
0703162-09	8270C Standard SVO(	Water	4RL	10	Mar-23-07	Mar-14-07	Prepared	[redacted]	[redacted]	GE Mt Vernon 8260/8270 in Wtr [GE Mt. Vernon 8270
0703162-14	8270C Standard SVO(	Water	4RL	10	Mar-23-07	Mar-14-07	Prepared	[redacted]	[redacted]	GE Mt Vernon 8260/8270 in Wtr [GE Mt. Vernon 8270
0703180-15	8270C TCL OLM 4.3	Waste	3FL	10	Mar-26-07	Mar-22-07	Available	[redacted]	Miscellaneous Sampling	
0703180-16	8270C TCL OLM 4.3	Waste	3FL	10	Mar-26-07	Mar-22-07	Available	[redacted]	Miscellaneous Sampling	
0703187-01	8270C TCLP SVOC o	Waste	3WI	10	Mar-26-07	Mar-12-07	Analyzed	[redacted]	Subcontract Serv. WI Cert. 999472650	Waste: TCLP VOC/Metals/SVOC+Pest
0703188-01	8270C MDEQ BNA	Water	2FL	10	Mar-27-07	Mar-19-07	Available	[redacted]	Rose Township Treatment System - Weekly	Weekly Effluent [8270 Field Blank/Weekly Eff bis-2EHP]
0703192-01	8270C Standard SVO(	Soil	2FL	6	Mar-21-07	Mar-27-07	Prepared	[redacted]	Clean Fill Program	Soil: Complete List (TACO) [Soil: TACO Tier 1 Class II
0703192-02	8270C Standard SVO(	Soil	2FL	6	Mar-21-07	Mar-27-07	Prepared	[redacted]	Clean Fill Program	Soil: Complete List (TACO) [Soil: TACO Tier 1 Class II
0703192-03	8270C Standard SVO(	Soil	2FL	6	Mar-21-07	Mar-27-07	Prepared	[redacted]	Clean Fill Program	Soil: Complete List (TACO) [Soil: TACO Tier 1 Class II
0703192-04	8270C Standard SVO(	Soil	2FL	6	Mar-21-07	Mar-27-07	Prepared	[redacted]	Clean Fill Program	Soil: Complete List (TACO) [Soil: TACO Tier 1 Class II
0703193-01	8270C TCLP SVOC o	Waste	2FLM	10	Mar-27-07	Mar-19-07	Prepared	[redacted]	Waste Characterization	soil wst: TCLPV,SV,8
0703200-01	625 SVOCs (TTOs)	Waste Water	2FLM	10	Mar-27-07	Mar-20-07	Available	[redacted]	Mthly Indust. WW; Permit 1-02-12-04-B001	PCBPestSV,metal,BOD,NH3, Phos,TSS

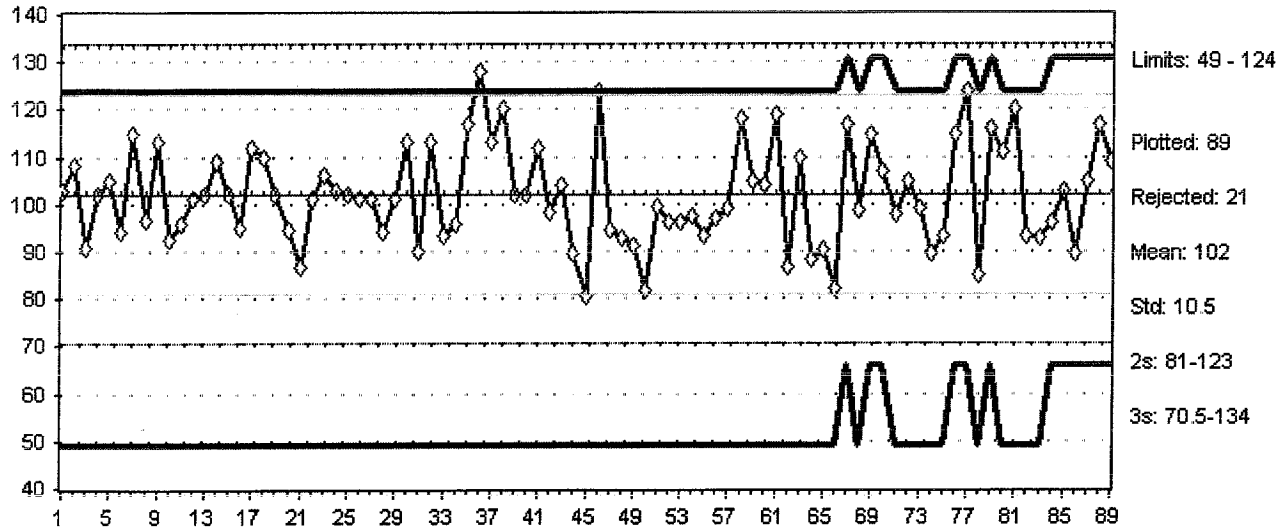
Appendix W

TriMatrix Laboratories, Inc. - LCS %R for FLUORANTHENE
8270C Standard SVOCs IN Water Printed: Mar-13-07 15:52 by RDW
All Clients/Projects [6/13/2006 to 3/14/2007]



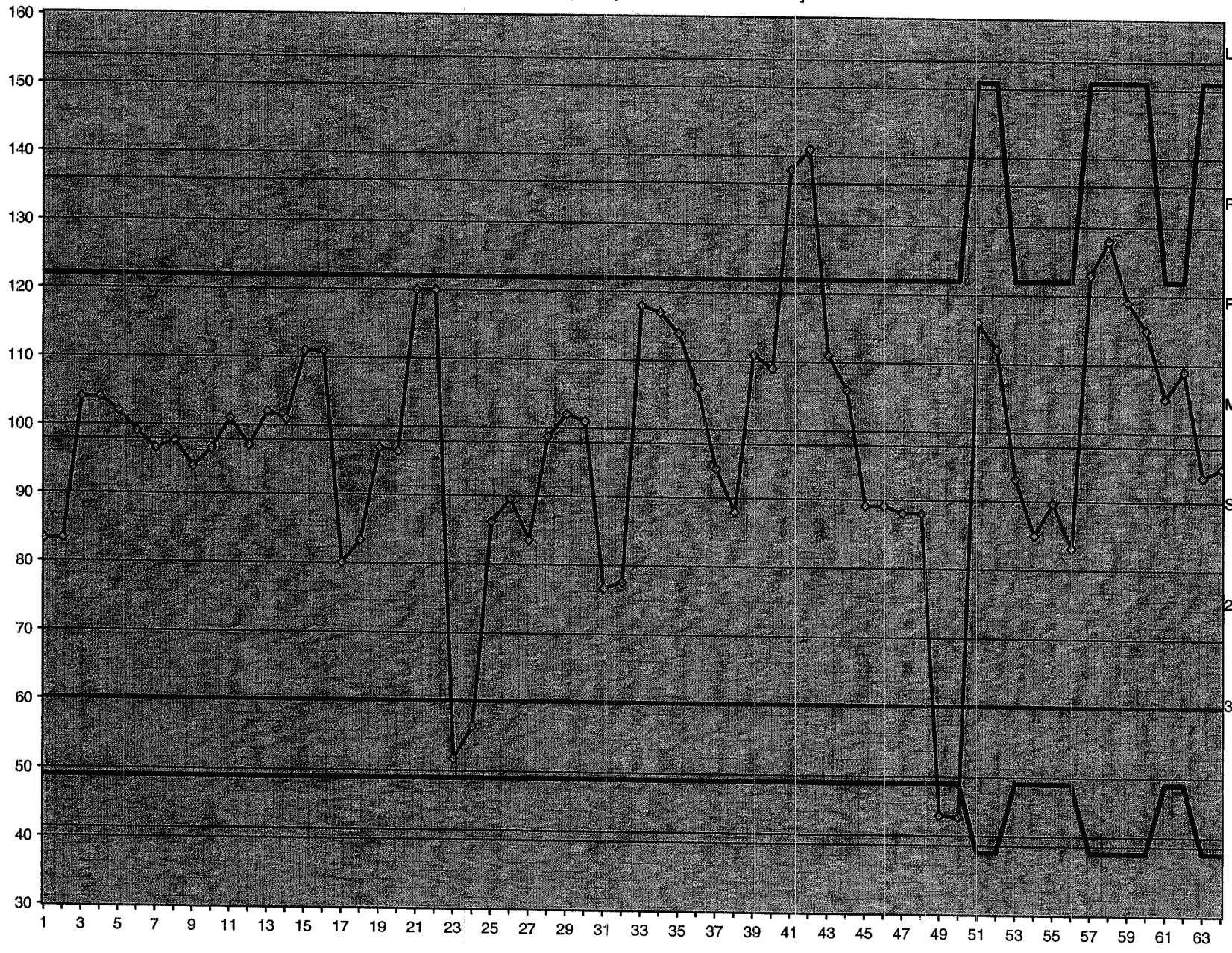
Printed:	Mar-14-07 10:14	Matrices:	Water
Client:	All Clients	Instruments:	All Instruments
Project:	All Projects	Prepared By:	All Extractionists
Analyses:	8270C Standard SVOCs	Analyzed By:	All Analysts
		Extractions:	All Extractions

Fluoranthene ***LCS %R***



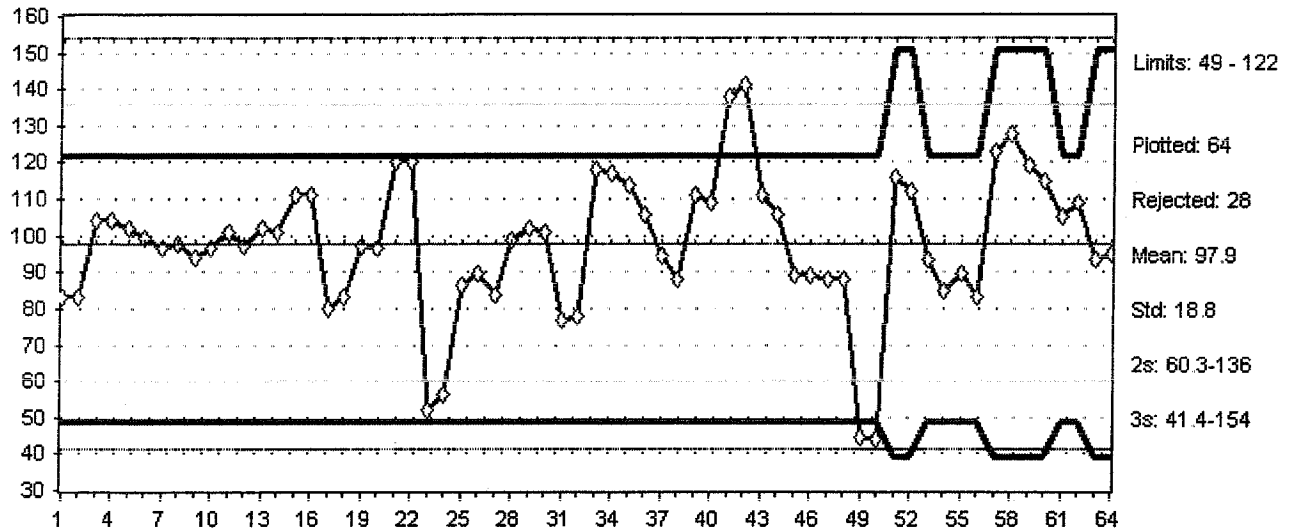
Rjct	Sample ID	Prepared	Analyzed	Spike Level	Result	%R	Limits	Qualifiers
	0606599-BS1	6/13/06	6/14/06	9.35 ug/L	9.639	103.0909	49-124	
	0606599-BSD1	6/13/06	6/14/06	9.35 ug/L	10.063	107.6257	49-124	
	0606634-BS1	6/14/06	6/15/06	9.35 ug/L	8.51	91.01604	49-124	
	0606750-BS1	6/14/06	6/15/06	9.35 ug/L	9.498	101.5829	49-124	
	0606750-BSD1	6/14/06	6/15/06	9.35 ug/L	9.789	104.6952	49-124	
	0607107-BS1	6/22/06	6/27/06	100 ug/L	94.08	94.08	49-124	
	0607108-BS1	6/22/06	6/28/06	100 ug/L	115.3	115.3	49-124	
	0607108-BS2	6/23/06	6/29/06	100 ug/L	96.47	96.47	49-124	
	0607107-BS2	6/26/06	6/28/06	100 ug/L	113.37	113.37	49-124	
	0607390-BS1	6/28/06	7/5/06	10 ug/L	9.261	92.61	49-124	
	0607390-BS2	6/29/06	7/6/06	10 ug/L	9.557	95.57	49-124	
	0607976-BS1	7/14/06	7/17/06	10 ug/L	10.096	100.96	49-124	
	0607974-BS1	7/17/06	7/18/06	10 ug/L	10.249	102.49	49-124	
	0607976-BS2	7/17/06	7/17/06	10 ug/L	10.875	108.75	49-124	
	0608137-BS1	7/19/06	7/20/06	10 ug/L	10.194	101.94	49-124	
	0608137-BS2	7/21/06	7/21/06	10 ug/L	9.479	94.79	49-124	
	0608305-BS1	7/24/06	8/1/06	10 ug/L	11.241	112.41	49-124	
	0608305-BSD1	7/24/06	8/1/06	10 ug/L	11.003	110.03	49-124	
	0608305-BS2	7/25/06	7/26/06	10 ug/L	10.194	101.94	49-124	
	0608305-BS5	7/25/06	8/1/06	10 ug/L	9.468	94.68	49-124	
X	0608305-BS3	7/26/06	8/1/06	10 ug/L	0		49-124	
	0608480-BS3	7/28/06	8/1/06	10 ug/L	8.69	86.9	49-124	
X	0608480-BS5	7/28/06	8/3/06	10 ug/L	0		49-124	
X	0608626-BS1	7/31/06	8/3/06	10 ug/L	0		49-124	
	0608559-BS1	7/31/06	8/2/06	10 ug/L	10.144	101.44	49-124	
X	0608559-BS3	7/31/06	8/3/06	10 ug/L	0		49-124	
X	0608305-BS4	8/2/06	8/4/06	10 ug/L	0		49-124	
	0608626-BS2	8/2/06	8/7/06	10 ug/L	10.557	105.57	49-124	

TriMatrix Laboratories, Inc. - MS %R for FLUORANTHENE
8270C Standard SVOCs IN Water Printed: Mar-13-07 15:52 by RDW
All Clients/Projects [6/13/2006 to 3/14/2007]



Printed:	Mar-14-07 10:14	Matrices:	Water
Client:	All Clients	Instruments:	All Instruments
Project:	All Projects	Prepared By:	All Extractionists
Analyses:	8270C Standard SVOCs	Analyzed By:	All Analysts
		Extractions:	All Extractions

Fluoranthene ***MS %R***



Rjct	Sample ID	Prepared	Analyzed	Spike Level	Result	%R	Source	Limits	Qualifiers
	0607107-MS1	6/22/06	6/27/06	94.33962 ug/L	78.56604	83.28	0606336-10 (ND)	49-122	
	0607107-MSD1	6/22/06	6/27/06	94.33962 ug/L	78.68868	83.41	0606336-10 (ND)	49-122	
	0607108-MS1	6/22/06	6/28/06	96.15385 ug/L	100.125	104.13	0606360-09 (ND)	49-122	
	0607108-MSD1	6/22/06	6/28/06	96.15385 ug/L	100.1923	104.2	0606360-09 (ND)	49-122	
	0607976-MS1	7/14/06	7/17/06	9.90099 ug/L	10.11584	102.17	0607167-03	49-122	
	0607976-MSD1	7/14/06	7/17/06	9.90099 ug/L	9.811881	99.1	0607167-03	49-122	
X	0607974-MS1	7/17/06	7/19/06	ug/L	1.047619E-02		607163-20 (5.714286E-0	49-122	
X	0607974-MSD1	7/17/06	7/19/06	ug/L	5.714286E-03		607163-20 (5.714286E-0	49-122	
X	0608480-MS1	7/28/06	8/2/06	9.803922 ug/L	0		0607395-03 (ND)	49-122	
X	0608480-MSD1	7/28/06	8/2/06	9.803922 ug/L	0		0607395-03 (ND)	49-122	
X	0608626-MS2	7/31/06	8/3/06	9.52381 ug/L	0		0607433-06 (ND)	49-122	
X	0608626-MSD2	7/31/06	8/8/06	9.52381 ug/L	0		0607433-06 (ND)	49-122	
	0608559-MS2	7/31/06	8/2/06	9.615385 ug/L	9.288461	96.59999	0607452-01 (ND)	49-122	
	0608559-MSD2	7/31/06	8/2/06	9.615385 ug/L	9.396154	97.72	0607452-01 (ND)	49-122	
X	0608559-MS1	7/31/06	8/3/06	9.615385 ug/L	0		0607424-01 (ND)	49-122	
X	0608559-MSD1	7/31/06	8/8/06	9.615385 ug/L	0		0607424-01 (ND)	49-122	
	0609741-MS1	8/28/06	8/29/06	9.52381 ug/L	8.954286	94.01999	0608405-04 (ND)	49-122	
	0609741-MSD1	8/28/06	8/29/06	9.52381 ug/L	9.201904	96.61999	0608405-04 (ND)	49-122	
X	0609739-MS1	8/29/06	9/6/06	ug/L	0		0608396-02 (ND)	49-122	
X	0609739-MSD1	8/29/06	9/6/06	ug/L	0		0608396-02 (ND)	49-122	
	0610007-MS1	8/29/06	8/30/06	9.52381 ug/L	9.610476	100.91	0608405-14 (ND)	49-122	
	0610007-MSD1	8/29/06	8/30/06	9.52381 ug/L	9.250476	97.12999	0608405-14 (ND)	49-122	
X	0610223-MS1	9/6/06	9/6/06	ug/L	0		0609018-08 (ND)	49-122	
X	0610223-MSD1	9/6/06	9/6/06	ug/L	1.176471E-02		0609018-08 (ND)	49-122	
X	0610456-MS1	9/12/06	9/16/06	ug/L	0.1057692		0609110-03 (0.1134615)	49-122	
X	0610456-MSD1	9/12/06	9/16/06	ug/L	0.1057692		0609110-03 (0.1134615)	49-122	
	0610556-MS1	9/14/06	9/18/06	94.33962 ug/L	96.64151	102.44	0609151-06 (ND)	49-122	
	0610556-MSD1	9/14/06	9/18/06	94.33962 ug/L	95	100.7	0609151-06 (ND)	49-122	
	0610617-MS1	9/15/06	9/19/06	95.2381 ug/L	105.6095	110.89	0609184-06 (ND)	49-122	
	0610617-MSD1	9/15/06	9/19/06	95.2381 ug/L	105.781	111.07	0609184-06 (ND)	49-122	

Appendix X

TriMatrix Laboratories, Inc.

Controlled Temperature Unit #49
Daily Log Sheet

Description: VWR General Purpose Incubator
Model Number: 1545
Serial #: 08039205
Location: Waste Storage Area

Purpose: Incubation of Bacteriological Sample Plates
Control Windows: Low: 34.5° C High: 35.5° C
Thermometer #'s: 175, 176, 189
Thermometer Serial #'s: 2398, 2419, 06298142

Date	Initials	Time of First Readings	First Reading (°C): Top Thermometer	First Reading (°C): Bottom Thermometer	Initials	Time of Second Readings	Second Reading (°C): Top Thermometer	Second Reading (°C): Bottom Thermometer	Adjustments/Observations/Comments

Appendix Y

TriMatrix Laboratories, Inc.

Balance Calibration Verification Acceptance Window Calculations

Balance ID: 208
Manufacturer: Mettler
Serial Number: B86211
Model Number: AE163

Calibration Source: External
Calibration Weight (g): 100
Calibration Weight Error (g): 0.00018207
Location: Inorganic Prep Lab; North Island, East Side

I. Calibration Weight Correction Calculations

Calibration Verification Weight Nominal Mass (g)	Calibration Verification Weight Correction Factor (g)	Calibration Verification Weight Actual Mass (g)	Linear Error of Balance (g)	Calibration Verification Weight Expected Mass (g)	Calibration Weight Combinations Used For Verification	
					Nominal	Actual
0.5000	0.00000623	0.5000	-0.00000091	0.5000	0.50	0.5000
1.0000	-0.00000201	1.0000	-0.00000182	1.0000	0.50 + 1.0	1.5000
5.0000	-0.00002845	5.0000	-0.00000910	5.0000	0.50 + 5.0	5.5000
100.0000	0.00003087	100.0000	-0.00018207	99.9998	0.50 + 100	100.4999

II. 20 Measurements Using Each Calibration Verification Mass

Date	Replicate Number	Mass 1 (g) 0.5000	Mass 2 (g) 1.5000	Mass 3 (g) 5.5000	Mass 4 (g) 100.4999		
	1						
	2						
	3						
	4						
	5						
	6						
	7						
	8						
	9						
	10						
	11						
	12						
	13						
	14						
	15						
	16						
	17						
	18						
	19						
	20						

III. Calibration Verification Acceptance Window Calculations

Standard Deviation:						
Random Error:						
Acceptance Window Low:						
Acceptance Window High:						

TriMatrix Laboratories, Inc.

Daily Balance Calibration Logbook

Balance ID: 208 **Serial #:** B86211 **Calibration Source:** External **Location:** Inorganic Preparation Lab;
Manufacturer: Mettler **Model #:** AE163 **Calibration Weight (g):** 100 North Island, East Side

Date	Analyst	Calibration Verification Expected Mass 0.5000	Window Pass / Fail 0.4996 -0.5004	Calibration Verification Expected Mass 1.5000	Window Pass / Fail 1.4995 -1.5005	Calibration Verification Expected Mass 5.5000	Window Pass / Fail 5.4994 -5.5006	Calibration Verification Expected Mass 100.5000	Window Pass / Fail 100.4992 -100.5005	Calibration Verification Expected Mass	Window Pass / Fail

Appendix Z

Row #	Standard Number	Standard Description	Analyte(s) (and/or Stock Standard Number for dilutions)	Manufacturer and Lot Numbers	Exp. Date	Ampule or Stock Standard Concentration	Initial Weight/ Volume	Solvent Used/ Lot #	Final Volume	Final Concentration	Made or Opened By	Date Made or Opened	Date Expires
1	VO7. -1												
2	VO7. -2												
3	VO7. -3												
4	VO7. -4												
5	VO7. -5												
6	VO7. -6												
7	VO7. -7												
8	VO7. -8												
9	VO7. -9												
10	VO7. -10												
11	VO7. -11												
12	VO7. -12												
13	VO7. -13												
14	VO7. -14												
15	VO7. -15												
16	VO7. -16												
17	VO7. -17												
18	VO7. -18												

8.0 GLOSSARY OF TERMS

ABSORBANCE - a measure of the decrease in incident light passing through a sample into the detector. It is defined mathematically as:

$$A = \left(\frac{I\,(solvent)}{I\,(solution)} \right) -- \frac{\log Io}{I}$$

ALIQUOT - a measured portion of a field sample taken for analysis.

ANALYSIS DATE/TIME - the date and time of the introduction of the sample, standard, or blank into the analysis system.

ANALYTE - the element or ion an analysis seeks to determine; the element of interest.

ANALYTICAL SAMPLE - any solution or media introduced into an instrument on which an analysis is performed excluding instrument calibration, initial calibration verification, initial calibration blank, continuing calibration verification and continuing calibration blank. Note the following are all defined as analytical samples: undiluted and diluted samples (EPA and non-EPA), predigestion spike samples, duplicate samples, serial dilution samples, analytical spike samples, post-digestion spike samples, interference check samples (ICS), CRDL standard for AA (CRA), CRDL standard for ICP (CRI), laboratory control sample (LCS), method preparation blank (MPB), laboratory fortified blank (LFB), and linear range analysis sample (LRS).

ANALYTICAL SPIKE - The furnace post-digestion spike. The addition of know amount of standard after digestion.

AUTOZERO - zeroing the instrument at the proper wavelength. It is equivalent to running a standard blank with the absorbance set at zero.

AVERAGE INTENSITY - the average of two different injections (exposures).

BACKGROUND CORRECTION - a technique to compensate for variable background contribution to the instrument signal in the determination of trace elements.

BLANK - an analytical sample designed to assess specific sources of laboratory contamination. See individual types of Blanks: Method Blank, Instrument Blank, Storage Blank, and Sulfur Blank.

BATCH - a group of samples prepared at the same time in the same location using the same method.

BREAKDOWN - a measure of the decomposition of certain analytes (i.e. DDT and Endrin) into by-products.

4-BROMOFLUOROBENZENE (BFB) - the compound chosen to establish mass spectral instrument performance for volatile (VOA) analyses.

CALIBRATION - the establishment of an analytical curve based on the absorbance, emission intensity, or other measured characteristic of known standards. The calibration standards must be prepared using the same type of acid or concentration of acids as used in the sample preparation.

CALIBRATION BLANK - a volume of acidified deionized/distilled water.

CALIBRATION STANDARDS - a series of known standard solutions used by the analyst for calibration of the instrument (i.e., preparation of the analytical curve).

CALIBRATION FACTOR (CF) - a measure of the gas chromatographic response of a target analyte to the mass injected during external calibration. The calibration factor is analogous to the Response Factor (RF) calculated during internal calibration.

CASE - a finite, usually predetermined number of samples collected over a given time period from a particular site. Case numbers are assigned by the Sample Management Office. A Case consists of one or more Sample Delivery Groups.

CHARACTERIZATION - a determination of the approximate concentration range of compounds of interest used to choose the appropriate analytical protocols.

CONCENTRATION LEVEL (low or medium) - characterization of soil samples or sample fractions as low concentration or medium concentration is made on the basis of the laboratory's preliminary screen, not on the basis of information entered by the sampler.

CONTAMINATION - a component of a sample or an extract that is not representative of the environmental source of the sample. Contamination may stem from other samples, sampling equipment, while in transit, from laboratory reagents, laboratory environment, or analytical instruments.

CONTINUING CALIBRATION - analytical standard run at periodic intervals to verify the initial calibration of the system.

CONTRACT REQUIRED DETECTION LIMIT (CRDL) - minimum level of detection acceptable as specified by the project.

CONTROL LIMITS - a range within which specified measurement results must fall to be compliant. Control limits may be mandatory, requiring corrective action if exceeded, or advisory, requiring that noncompliant data be flagged.

CORRELATION COEFFICIENT - a number (r) which indicates the degree of dependence between two variables (concentration - absorbance). The more dependent they are the closer the value to one. Determined on the basis of the least squares line.

DAY - unless otherwise specified, day shall mean calendar day.

DIGESTION LOG - an official record of the sample preparation (digestion).

DISSOLVED METALS - analyte elements which have not been digested prior to analysis and which will pass through a 0.45 um filter.

DRY WEIGHT - the weight of a sample based on percent solids. The weight after drying in an oven.

DUPLICATE - a second aliquot of a sample that is treated the same as the original sample in order to determine the precision of the method.

EXTRACTED ION CURRENT PROFILE (EICP) - a plot of ion abundance versus time (or scan number) for ion(s) of specified mass(es).

EXTRACTABLE - a compound that can be partitioned into an organic solvent from the sample matrix and is amenable to gas chromatography. Extractables include semivolatile (BNA) and pesticide/Aroclor compounds.

FIELD BLANK - any sample submitted from the field identified as a blank.

FIELD SAMPLE - a portion of material received to be analyzed that is contained in single or multiple containers and identified by a unique Sample Number.

FLAME ATOMIC ABSORPTION (AA) - atomic absorption which utilizes flame for excitation.

GRAPHITE FURNACE ATOMIC ABSORPTION (GFAA) - atomic absorption which utilizes a graphite cell for excitation.

GAS CHROMATOGRAPH (GC) - the instrument used to separate analytes on a stationary phase within a chromatographic column. The analytes are either volatized directly from the sample (VOA water and low-soil), from the sample extract (VOA medium soil), or injected as an extracted sample (SVOA and PEST). In VOA and SVOA analysis, the compounds are detected by a Mass Spectrometer (MS). In PEST analysis, the compounds are detected by an Electron Capture Detector (ECD). In the screening procedure (all fractions), the Flame Ionization Detector (FID) is used as the detector.

HOLD TIME - the maximum allowable elapsed time expressed in days from the date the sample is collected until the date of its pre-treatment or analysis.

INDEPENDENT STANDARD – an externally prepared standard solution that is composed of analytes from a different source than those used in the standards for the initial calibration.

INDUCTIVELY COUPLED PLASMA (ICP) - a technique for the simultaneous or sequential multi-element determination of elements in solution. The basis of the method is the measurement of atomic emission by an optical spectroscopic technique. Characteristic atomic line emission spectra are produced by excitation of the sample in a radio frequency inductively coupled plasma.

IN-HOUSE - at the laboratories facility.

INITIAL CALIBRATION - analysis of analytical standards for a series of different specified concentrations; used to define the linearity and dynamic range of the response of the instrument.

INJECTION - introduction of the analytical sample into the instrument excitation system for the purpose of measuring absorbance, emission or concentration of an analyte. May also be referred to as exposure.

INSTRUMENT CALIBRATION - analysis of analytical standards for a series of different specified concentrations; used to define the quantitative response, linearity, and dynamic range of the instrument.

INSTRUMENT DETECTION LIMIT (IDL) - determined by multiplying by three the standard deviation obtained for the analysis of a standard solution (each analyte in reagent water) at a concentration of 3x-5x IDL on three nonconsecutive days with seven consecutive measurements per day.

INSTRUMENT CHECK SAMPLE - a solution containing both interfering and analyte elements of known concentration that can be used to verify background and interelement correction factors.

INSTRUMENT CHECK STANDARD - a multi-element standard of known concentrations prepared by the analyst to monitor and verify instrument performance on a daily basis.

INTERFERENTS - substances which affect the analysis for the element of interest.

INTERNAL STANDARDS - compounds added to analytical and quality control samples at a known concentration prior to analysis. In the methods that require them, internal standards are used as the basis for quantitation of the target compounds.

INSTRUMENT/ANALYTICAL BLANK - a blank designed to determine the level of contamination associated with the analytical instruments.

INSUFFICIENT QUANTITY - when there is not enough volume (water sample) or weight (soil/sediment) to perform any of the required operations: sample analysis or extraction, percent moisture, MS/MSD, etc.

LABORATORY CONTROL SAMPLE (LCS) - a standard prepared from a source other than that used to prepare the quantitation standard, and used to verify the initial calibration curve.

LABORATORY FORTIFIED BLANK (LFB) - a control sample of known composition. Aqueous and solid laboratory control samples are analyzed using the same sample preparation, reagents, and analytical methods employed for the samples received.

LABORATORY RECEIPT DATE - the date on which a sample is received as recorded on the chain of custody.

LINEAR RANGE, LINEAR DYNAMIC RANGE - the concentration range over which the determinative instrument's analytical curve remains linear.

MATRIX - the predominant material of which the sample to be analyzed is composed. Matrix is not synonymous with phase (liquid or solid).

MATRIX EFFECT - in general, the effect of the particular sample matrix on the constituents with which is contacts. This is particularly pronounced for clay particles which may adsorb chemicals and catalyze reactions. Matrix effects may prevent extraction of target analytes, and may affect surrogate recoveries. In addition, non-target analytes may be extracted from the matrix causing interferences.

MATRIX MODIFIER - salts used in AA to lessen the effects of chemical interferents, viscosity, and surface tension.

MATRIX SPIKE - aliquot of a matrix spiked with known quantities of specific compounds and subjected to the entire analytical procedure. Matrix spikes are used to indicate the accuracy of the method on the matrix by measuring the recovery of the spiked analyte.

MATRIX SPIKE DUPLICATE - a second aliquot of the same matrix as the matrix spike (above) that is spiked in order to determine the precision of the method.

METHOD BLANK - an analytical control consisting of all reagents, internal standards and surrogate standards that are carried throughout the entire analytical procedure. The method blank is used to define the level of laboratory, background and reagent contamination.

METHOD OF STANDARD ADDITIONS (MSA) - the addition of 3 increments of a standard solution (spikes) to sample aliquots of the same size. Measurements are made on the original and after each addition. The slope, x-intercept and y-intercept are determined by least-square analysis. The analyte concentration is determined by the absolute value of the x-intercept. Ideally, the spike volume is low relative to the sample volume (approximately 10% of the volume). Standard addition may counteract matrix effects; it will not counteract special effects. Also referred to as Standard Addition.

m/z - Mass to charge ration, synonymous with "m/e"

NARRATIVE - portion of the data package which includes laboratory, contract, case and sample number identification, and descriptive documentation of any problems encountered in processing the samples, along with corrective action taken and problem resolution.

PERCENT DIFFERENCE (%D) - to compare two values, the percent difference indicates both the direction and the magnitude of the comparison, i.e., the percent difference may be either negative, positive, or zero. (In contrast, see relative percent difference).

PERCENT MOISTURE - an approximation of the amount of water in a soil/sediment sample made by drying an aliquot of the sample at 105° C. The percent moisture determined in this

manner also includes contributions from all compounds that may volatilize at or below 105° C, including water. Percent moisture may be determined from decanted samples and from samples that are not decanted.

PERCENT SOLIDS - the proportion of solid in a soil sample determined by drying an aliquot of the sample.

PERFORMANCE EVALUATION MIXTURE - a calibration solution of specific analytes used to evaluate both recovery and percent breakdown as measures of performance.

PERFORMANCE EVALUATION (PE) SAMPLE - a sample of known composition obtained from an external provider for analysis. Used by clients and regulatory agencies to evaluate laboratory performance.

PREPARATION BLANK (reagent blank, method blank) - an analytical control that contains distilled/deionized water and reagents, which is carried through the entire analytical procedure – digested/distilled/extracted and analyzed. An aqueous method blank is treated with the same reagents as a sample with a water matrix; a solid method blank is treated with the same reagents as a soil sample.

PRIMARY QUANTITATION ION - a specific ion used to quantitate a target analyte.

PROTOCOL - a compilation of the procedures to be followed with respect to sample receipt and handling, analytical methods, data reporting and deliverables, and document control.

PURGE AND TRAP (DEVICE) - analytical technique (device) used to isolate volatile (purgeable) organics by stripping the compounds from water or soil by a stream of inert gas, trapping the compounds on an adsorbent such as a porous polymer trap, and thermally desorbing the trapped compounds onto the gas chromatographic column.

PURGEABLES - volatile compounds.

QUALITY CONTROL SAMPLE - a solution obtained from an outside source having known concentration values to be used to verify the calibration standards.

REAGENT BLANK - a volume of deionized, distilled water containing the same acid matrix as the calibration standards carried through the entire analytical scheme.

REAGENT WATER - water in which an interferent is not observed at or above the minimum reporting limit of the parameters of interest.

RECONSTRUCTED ION CHROMATOGRAM (RIC) - a mass spectral graphical representation of the separation achieved by a gas chromatograph; a plot of total ion current versus retention time.

RELATIVE PERCENT DIFFERENCE (RPD) - The relative percent difference is based on the mean of two values, and is reported as an absolute value, i.e., always expressed as a positive number or zero. In contrast, see percent difference above.

RELATIVE RETENTION TIME (RRT) - the ratio of the retention time of a compound to that of a standard (such as an internal standard).

$$RRT = \frac{RTc}{RTis}$$

where,

RTc = Retention time for the target or surrogate compound in continuing calibration.

Rtis = Retention time for the internal standard in calibration standard or in a sample.

RELATIVE STANDARD DEVIATION (RSD) - the variation of a series of results based on the standard deviation and an average recovery. Typically used in the evaluation of initial calibration curves.

$$RSD = \frac{SD}{\text{Average RF}}$$

RESOLUTION - the separation between peaks on a chromatogram, calculated by dividing the depth of the valley between the peaks by the peak height of the smaller peak being resolved, multiplied by 100.

RESPONSE - or Instrumental Response: a measurement of the output of the detector in which the intensity of the signal is proportionate to the amount (or concentration) detected. Measured by peak area or peak height.

RESPONSE FACTOR (RF) - a measure of the relative mass spectral response of an analyte compared to its internal standard. Response Factors are determined by analysis of standards and are used in the calculation of concentrations of analytes in samples. The RF is determined by the following equation:

$$RF = \left(\frac{Ax}{Ais} \times \frac{Cis}{Cx} \right)$$

where:
A = area of the characteristic ion measured
C = concentration
is = internal standard
x = analyte of interest

RETENTION TIME (RT) - the time a target analyte is retained on a GC column before elution. The identification of a target analyte is dependent on a target compound's retention time falling within the specified retention time window established for that compound. Retention time is dependent on the nature of the column's stationary phase, column diameter, temperature, flow rate, and other parameters.

ROUNDING RULES - If the figure following those to be retained is less than 5, the figure is dropped, and the retained figures are kept unchanged. As an example, 11.443 is rounded off to 11.44.

If the figure following those to be retained is greater than 5, the figure is dropped, and the last retained figure is raised by 1. As an example, 11.446 is rounded off to 11.45.

If the figure following those to be retained is 5, and if there are no figures other than zeros beyond the five, the figure 5 is dropped, and the last-place figure retained is increased by one if it is an odd number or it is kept unchanged if an even number. As an example, 11.435 is rounded off to 11.44, while 11.425 is rounded off to 11.42.

If a series of multiple operations is to be performed (add, subtract, divide, multiply), all figures are carried through the calculations. Then the final answer is rounded to the proper number of significant figures.

RUN - a continuous analytical sequence consisting of prepared samples and all associated quality assurance measurements.

SAMPLE - a portion of material to be analyzed that is contained in single or multiple containers and identified by a unique sample number.

SAMPLE NUMBER - a unique identification number designated for each sample. The Sample Number appears on all laboratory documents which contain information on that sample.

SEMIVOLATILE COMPOUNDS - compounds amenable to analysis by extraction of the sample with an organic solvent. Used synonymously with Base/Neutral/Acid (BNA) compounds.

SENSITIVITY - the slope of the analytical curve, i.e., functional relationship between emission intensity and concentration.

SERIAL DILUTION - the dilution of a sample by a factor of five. When corrected by the dilution factor, the diluted sample must agree with the original undiluted sample within specified limits. Serial dilution may reflect the influence of interferents.

SOIL - synonymous with soil/sediment or sediment as used herein.

SONICATOR - a device that uses the energy from controlled ultrasound applications to mix, disperse, and dissolve organic materials from a given matrix.

SPECTRA - a plot of the mass-to-charge ratio (m/e) versus relative intensity of the ion current.

STANDARD ANALYSIS - an analytical determination made with known quantities of target compounds; used to determine response factors.

STORAGE BLANK - a reagent water aliquot stored with samples and analyzed on a weekly basis. The storage blank is used to determine the potential for sample contamination occurring during storage.

STOCK SOLUTION - a standard solution diluted to derive other standards.

SURROGATES (Surrogate Standard) - for semivolatiles, volatiles and pesticides/Aroclors, compounds added to every blank, sample, matrix spike, matrix spike duplicate, and standard; used to evaluate analytical efficiency by measuring recovery. Surrogates are brominated, fluorinated, or isotopically labeled compounds not expected to be present in the sample.

SUSPENDED - those elements which are retained by a 0.45 um membrane filter.

TENTATIVELY IDENTIFIED COMPOUNDS (TIC) - compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates. Up to 30 peaks (those greater than 10% of peak areas or heights of nearest internal standards) are subjected to mass spectral library searches for tentative identification.

TOTAL METALS - analyte elements which have been digested prior to analysis.

TWELVE-HOUR TIME PERIOD - The twelve (12) hour time period for GC/MS system instrument performance check, standards calibration (initial or continuing calibration), and method blank analysis begins at the moment of injection of the DFTPP or BFB analysis that the laboratory submits as documentation of instrument performance. The time period ends after 12 hours have elapsed according to the system clock. The injection time of the last analyses in the batch must be made within 12 hours of the injection time of BFB of DFTPP.

VOLATILE COMPOUNDS - compounds amenable to analysis by the purge and trap technique. Used synonymously with purgeable compounds.

WET WEIGHT - the weight of a sample aliquot including moisture (un-dried).

WIDE BORE CAPILLARY COLUMN - a gas chromatographic column with an internal diameter (ID) that is greater than 0.32 mm. Columns with lesser diameters are classified as narrow bore capillaries.

10% FREQUENCY - a frequency specification during an analytical sequence allowing for no more than 10 analytical samples between required calibration verification measurements.